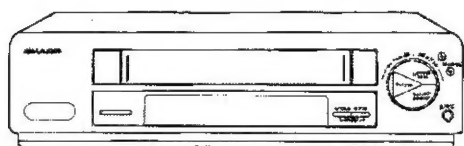


SHARP SERVICE MANUAL

S4506VC-M20HM

VHS VIDEO CASSETTE RECORDER



MODEL VC-M20HM

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

SHARP CORPORATION

PRECAUTIONS IN PART REPLACEMENT

When servicing the unit with power on, be careful to the section marked white all over.

This is the primary power circuit which is live.

When checking the soldering side in the tape travel mode, make sure first that the tape has been loaded and then turn over the PWB with due care to the primary power circuit.

Make readjustment, if needed after replacement of part, with the mechanism and its PWB in position in the main frame.

(1) Start and end sensors: Q851 and Q852

Insert the sensor's projection deep into the upper hole of the holder (LHLDZ1893AJ00). Referring to the PWB, fix the sensors tight enough.

(2) Photocoupler RH-FX0005GEZZ: IC901

Refer to the symbol on the PWB and the anode marking of the part.

(3) Cam switches A and B (RH-PX0231GEZZ or RH-PX0238GEZZ): D852 and D853

Adjust the notch of the part to the white marker of the symbol on the PWB. Do not allow any looseness.

(4) Take-up and supply sensors (RH-PX0232GEZZ): D855 and D854

Be careful not to confuse the setting direction of the parts in reference to the symbols on the PWB. Do not allow any looseness.

(5) Diode bridge (RH-DX0083GEZZ): D901

Adjust the + marking of the part to the symbol's cathode marking on the PWB.

1. SPECIFICATIONS

| | |
|-----------------------------|--|
| Format: | VHS PAL standard |
| Video recording system: | Two rotary heads, helical scan system |
| Video signal: | PAL colour and B/G signals, 625 lines |
| Recording/playing time: | 240 min max. with SHARP E-240 tape (SP) 480 min max. with SHARP E-240 tape (LP) |
| Tape width: | 12.7mm |
| Tape speed: | 23.39 mm/s (SP) 11.70 mm/s (LP) |
| Antenna: | 75 ohm unbalanced |
| Receiving channel: | UHF Channel E21-E69 |
| RF converter output signal: | UHF Channel E30-E39 (preset to CH E36) |
| Power requirement: | AC230V-240V, 50Hz |
| Power consumption: | Approx. 15 W (230V) |
| Operating temperature: | 5°C to 40°C |
| Storage temperature: | -20°C to 60°C |
| Weight: | Approx. 3.5 kg |
| Dimensions: | 380 mm (W) x 290.3 mm (D) x 91.8 mm (H) |
| VIDEO | |
| Input: | 1.0 Vp-p, 75 ohm |
| Output: | 1.0 Vp-p, 75 ohm |
| S/N ratio: | 45 dB |
| Horizontal resolution: | 250 lines |
| AUDIO | |
| Input: | Line: -3.8 dB, 47k ohm |
| Output: | Line: -3.8 dB, 1k ohm |
| S/N ratio: | 42 dB |
| Frequency response: | 80 Hz ~ 10 kHz |
| Accessories included: | 75 ohm coaxial cable Operation manual Infrared remote control Battery (2pcs.) |

As part of our policy of continuous improvement, we reserve the right to alter design and specifications without notice.

Note: The antenna must correspond to the new standard DIN 45325 (IEC 169 - 2) for combined UHF/VHF antenna with 75 ohm connector.

BEFORE RETURNING THE VIDEO CASSETTE RECORDER

In addition to the checks necessary as a result of a repair having been carried out, the following additional safety checks should also be made before returning the unit to the user.

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the Video cassette recorder.
2. Inspect all protective devices such as non-metallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacitor networks, mechanical insulators etc.
3. Apply test voltage of 3000 volts between live parts and accessible metal parts for 3 seconds.

PRECAUTIONS IN SERVICING THE MS2 PAL SYSTEM MODELS

1. Mounting the PWBs

The basic set-up procedure for these models is the same as for the MS1 models (1994 models). Refer to the VC-A49GM handbook, for example.

(1) Hand-inserted parts

Make sure that the tuner, RCA jack, 21-pin socket, plug socket, remote control receiver, shielding case, switches, mechanism sensors and other hand-inserted parts are tight in position.

- ① The general safety instructions are issued by Safety Group. Follow the "Safety Precautions". Be also sure that the primary-power capacitors C905, C906 and C915 (parts depending on models) are tight enough in place.

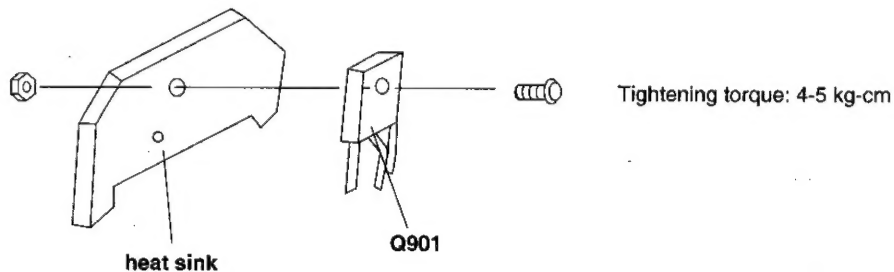
- ② Transformer and switching transistor

(Only for models: VC-MA31, MA221, MA441, MA51, MH83, VR136, MH93, MA63)

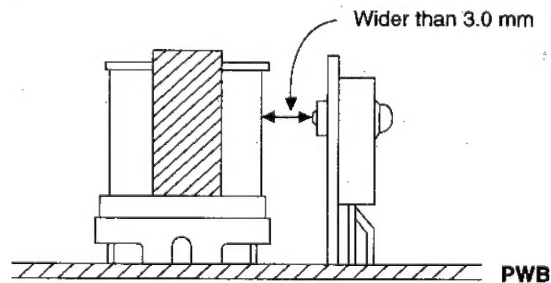
The following instructions apply to the above models.

Mounting the transistor Q901 on the PWB

[Preparatory step] Fix Q901 on the heat sink.



Install the above transistor/heat sink assembly on the PWB. Make sure that there is a clearance of over 3.0 mm between the Q901 fixing screw and the transformer T901.

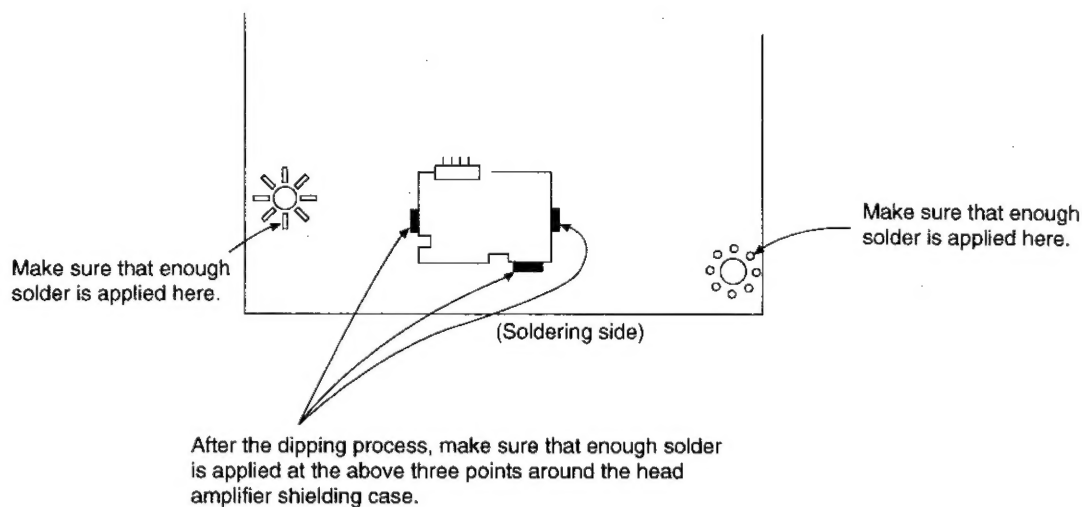


- ③ Handle the sensors and switches (start sensor, end sensor, cam switch, reel sensor, and record tip sensor) with care.

* The preparatory step for the start and end sensors is the same as for the MS1 models.

(2) Soldered parts

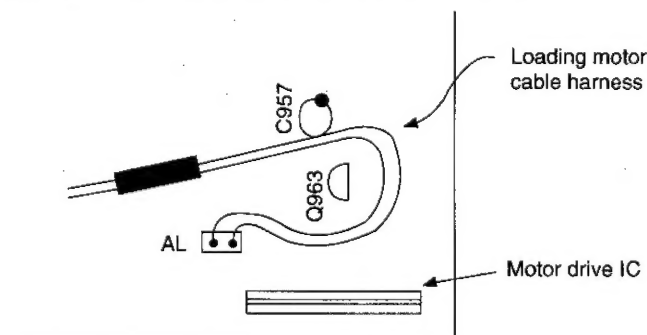
- ① The board-to-board connector "AO", RCA jack and some other parts are soldered in position.

**(3) Coaxial cables (QCNW-0182AJZZ)**

- ① Models for: VC-A37X, VC-A37NZ, VC-A631X, VC-MA31E, VR-136, VC-M221, VC-MA441, VC-MA51
Connect the cable's straight end to the tuner and the L-shaped end to the converter.
- ② Models for: VC-M20GM, VC-M201GM, VC-M19SM, VC-M20HM, VC-M40SM, VC-M401SM, VC-M200BM, VC-M400BM
Connect the cable's L-shaped end to the tuner and the straight end to the converter.

2. Assembling the chassis**(1) Dressing the cables**

- ① Be careful not to connect the flexible flat cables upside down. Their sockets are in special shape.
- ② Install the harnesses with care not to get caught by the frame and the mechanism (cassette controller).
- ③ Make sure that all the harnesses are tight in position.
- ④ Shape the loading motor cable harness as shown below.

**(2) Mounting the mechanism**

- * Set up the mechanism with care to the sensors and the record tip switch. Keep the sensors free of dust, grease, etc.
- * Install the capstan motor with correct connections between the circuit boards.

(3) Tightening the screws

Follow the instructions from Mechanism Group.

2. DISASSEMBLY AND REASSEMBLY

2-1 DISASSEMBLY OF MAJOR BLOCKS

- TOP CABINET

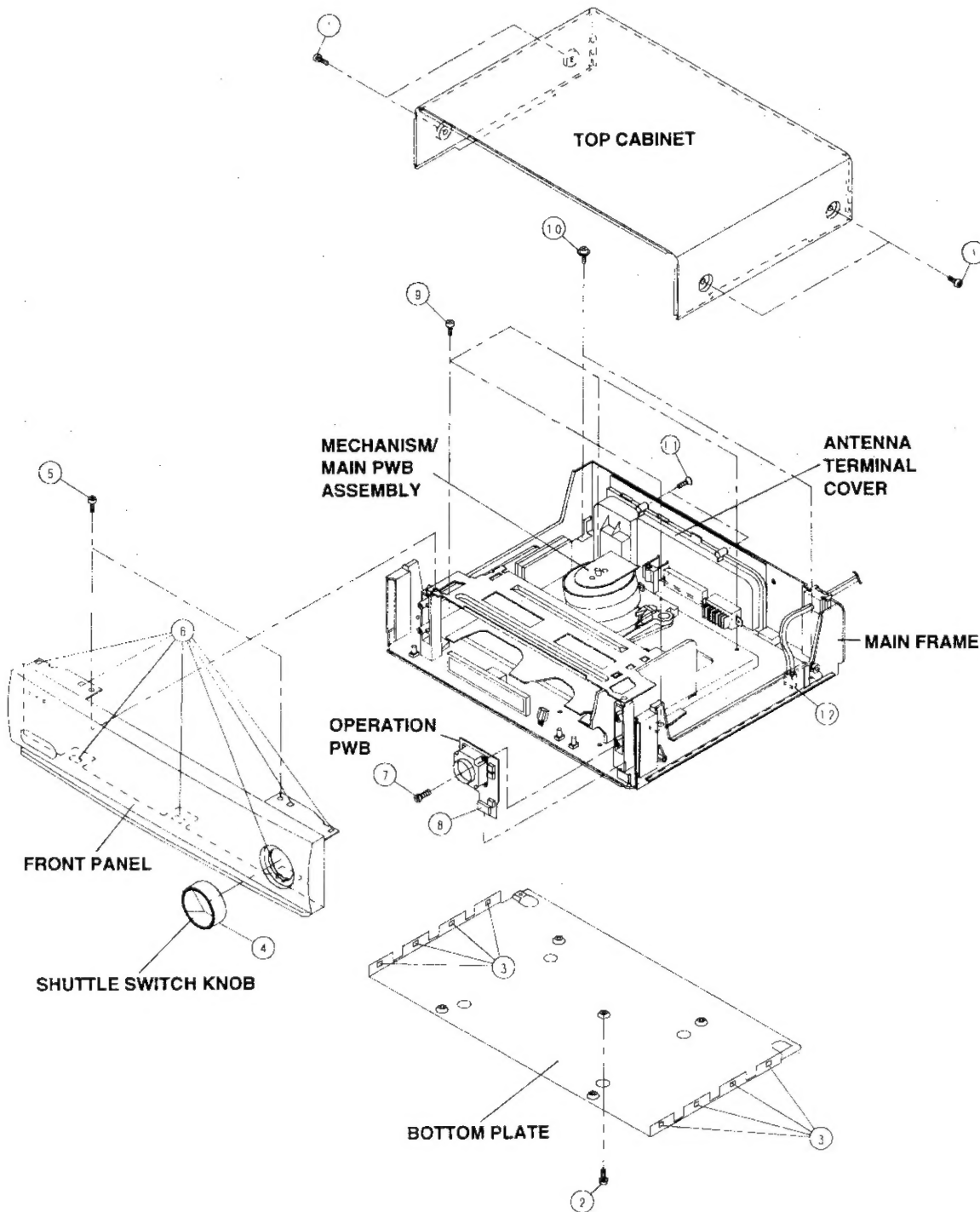
: Remove 4 screws ①.
- BOTTOM PLATE

: Remove 1 screw ② and 8 hooks ③.
- FRONT PANEL

: Remove shuttle switch knob ④.
Remove 2 screws ⑤ and 7 clips ⑥.
- OPERATION
(SHUTTLE JOG)
PWB

: Remove 1 screw ⑦. Take it out of connector ⑧.
- MECHANISM/
MAIN PWB
ASSEMBLY

: Remove 4 screws ⑨, 2 screws ⑩. Remove 2 screws ⑪ and 1 connector ⑫. Lift the antenna terminal cover and take the assembly out of the main frame.



2-2 DISASSEMBLING THE MECHANISM/MAIN PWB ASSEMBLY

SHIELD CASE : Remove 1 screw (13) and 1 screw (14).

ANTENNA : Remove 2 screws ⑮ and 1
TERMIANL COVER screw ⑯.

MECHANISM CHASSIS/ : Remove 3 FFCs and 2 harnesses (17).

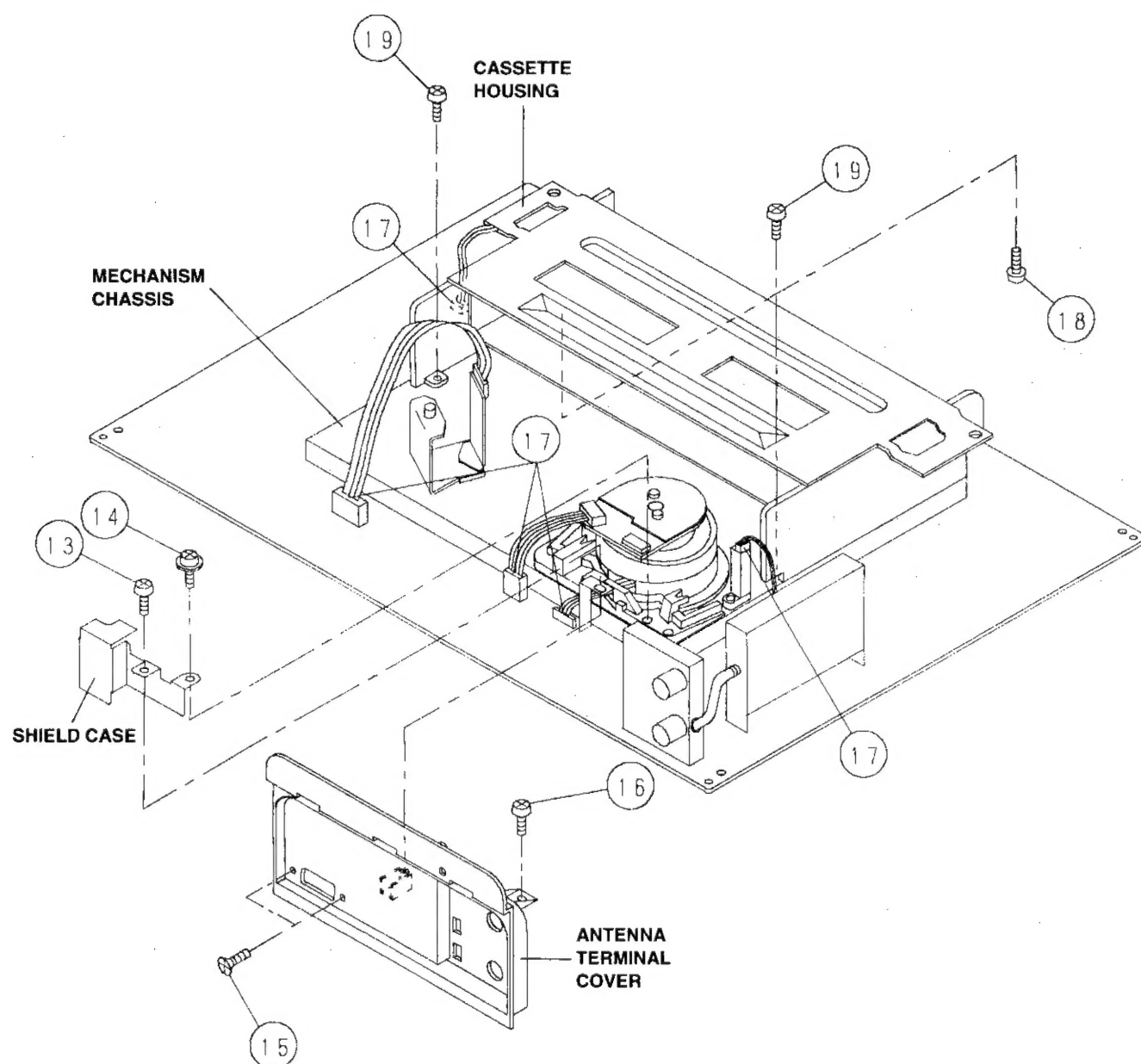
CASSETTE HOUSING ASSEMBLY

Remove 1 screw ⑮ from behind the main PWB.

Lift the mechanism chassis/cassette housing assembly vertically to take it out of the main PWB.

: Remove 2 screws (19).

CASSETTE HOUSING



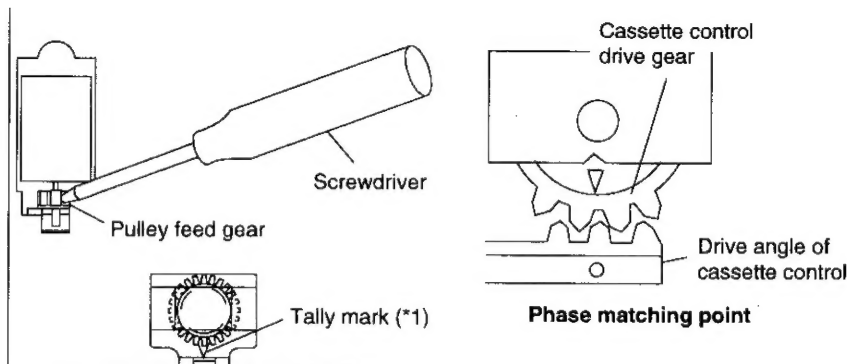
2-3 PRECAUTIONS IN REASSEMBLING

MOUNTING THE CASSETTE CONTROLLER

Initial setting is indispensable before placing the cassette controller in the mechanism. The initial setting is made in two ways; electrical and mechanical.

Electrical setting:

Make a short-circuit between TP5005 and TP5006, both located at the center on your side on main PWB, with a 22 ohm resistor and be sure that the mechanism is back to its initial setting position (*1). Now place the cassette controller in position. (This method is used when the mechanism has been already set on its PWB.)



Mechanical setting:

Turn the loading motor's pulley feed gear using a screwdriver and be sure that the mechanism is back to its initial setting position (*1). Now place the cassette controller in position. (This method is applicable for the mechanism alone.)

COUPLING THE MECHANISM TO THE PWB

Match the mechanism's projections with the two symbols (round reference and oval sub-reference) on the main PWB. Place the mechanism straight down in position with due care so that the mechanism chassis's outer edges should not damage any parts nearby.

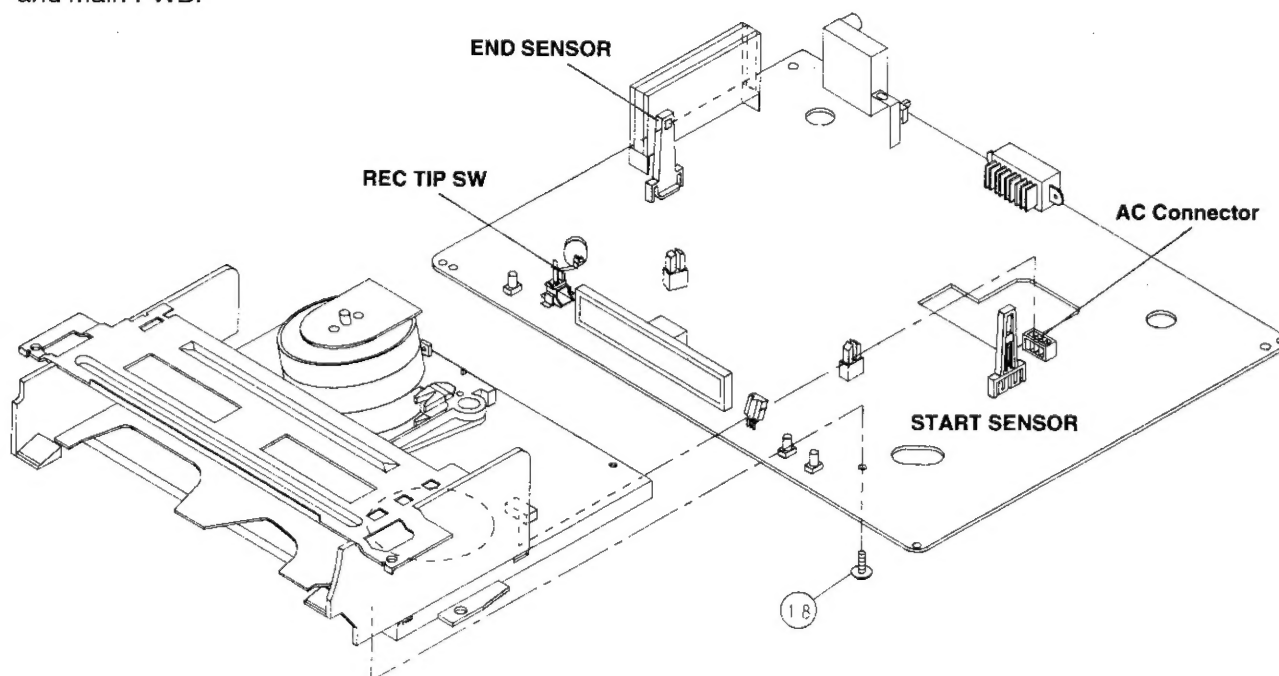
Tighten up the two screws (one for fixing the mechanism and the head amplifier shield, the other on the main PWB's soldering side and located near the loading motor) to fix the mechanism and main PWB. Reconnect the FFC cables (AA, AD and AH) and harnesses (AE and AL) between the mechanism and main PWB.

Parts to pay attention to:

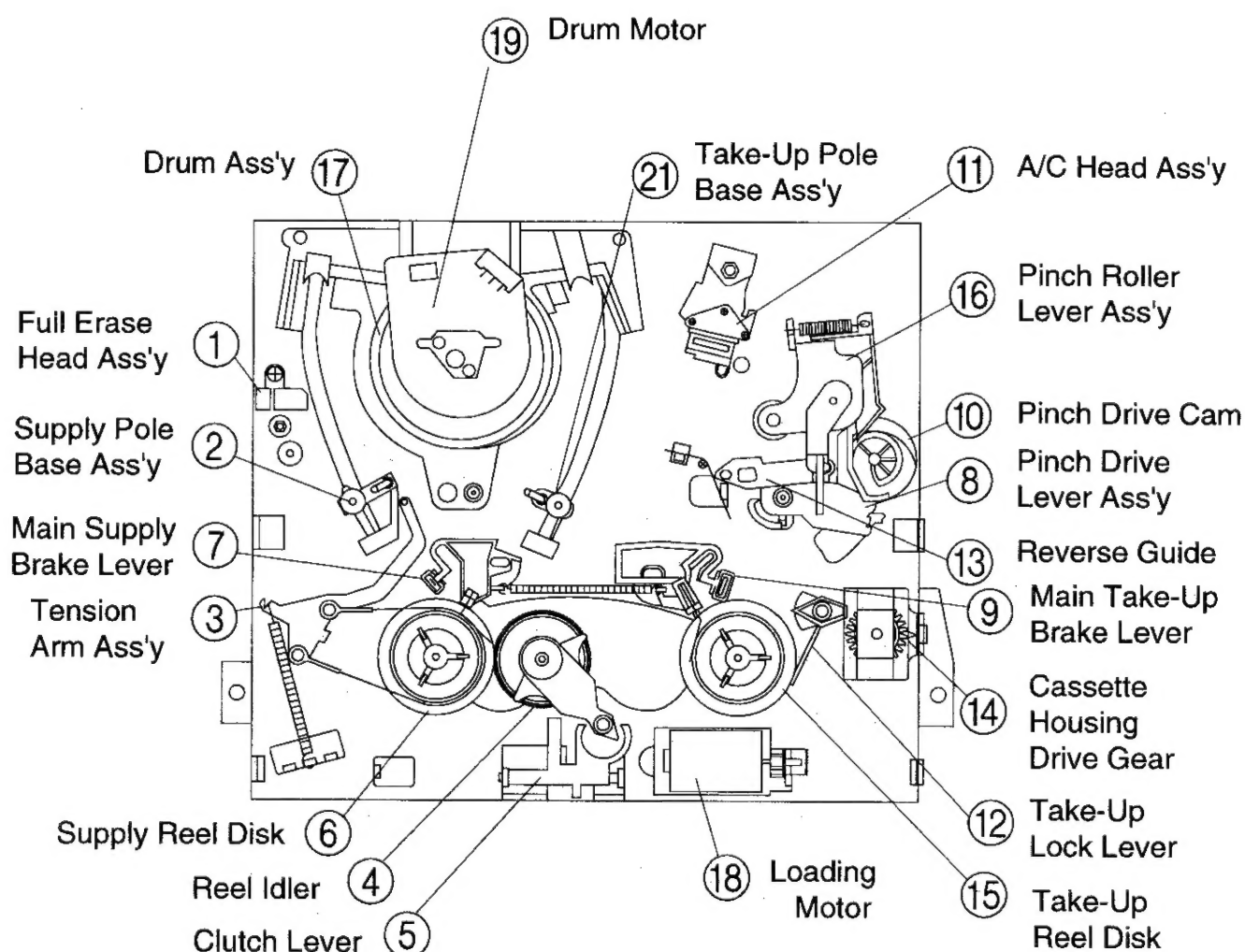
Start and end sensors Q851, Q852

Record tip switch S851

Take special care of the MC-AC connector (board to board) between the mechanism and main PWB.

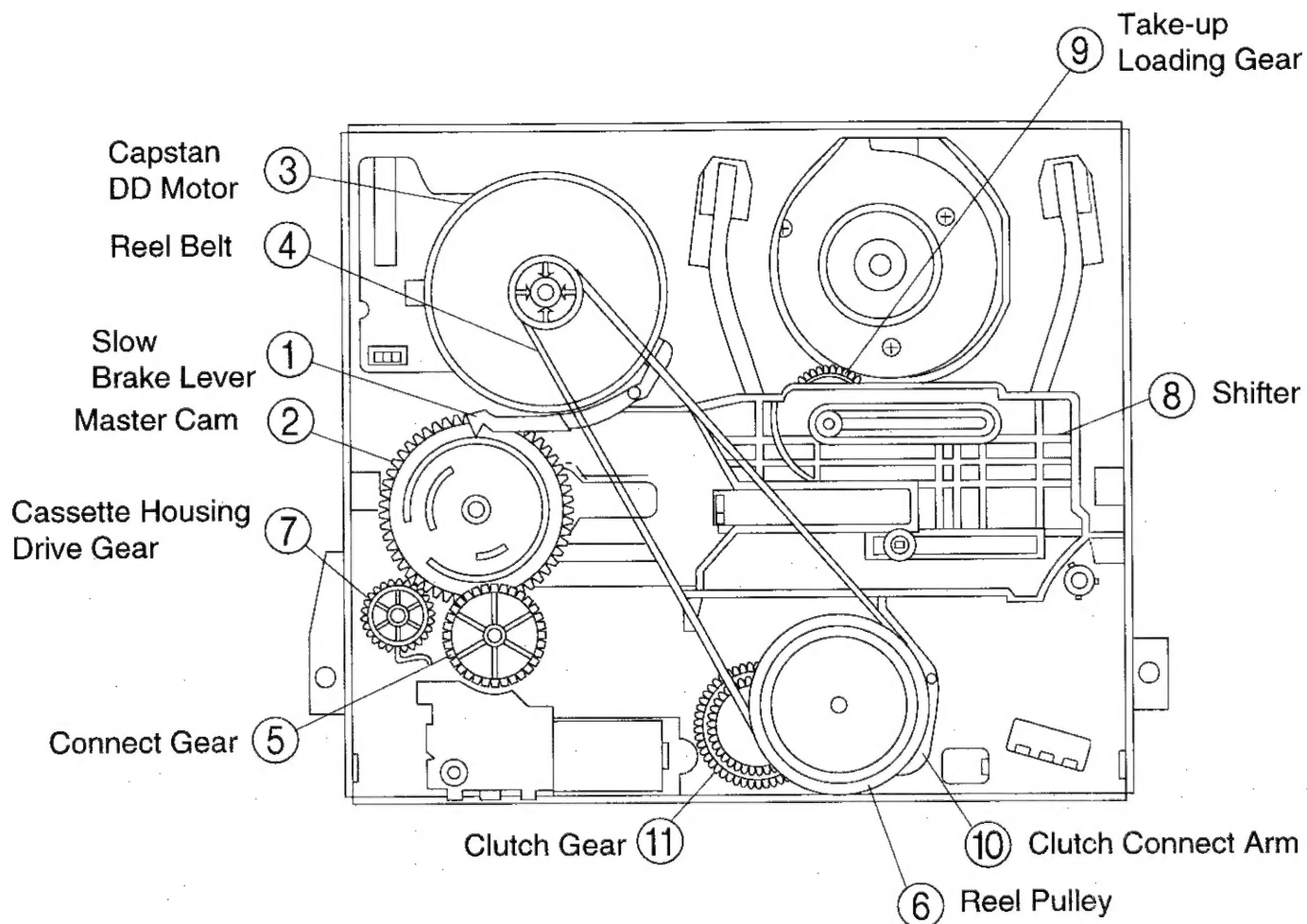


3. FUNCTION OF MAJOR MECHANICAL PARTS (TOP VIEW)



| No. | Function | No. | Function |
|-----|--|-----|--|
| 1. | Full erase head ass'y Erase the whole records on the tape in the recording mode. | 13. | Reverse guide Pulls out the tape and controls the tape drive train height with the upper and lower guides. |
| 3. | Tension arm ass'y Detects the tension of tape while running, and brakes the supply reel disk via the tension band. | 16. | Pinch roller lever ass'y Press-fits the tape to the capstan during tape running. The right protrusion switches the clutch of the cassette housing control assembly in "tape eject", and makes the mechanism eject tape. |
| 7. | Main supply brake lever Brakes the supply reel disk to prevent tape slackening when the unit is stopped in fast forward or rewind mode. | 18. | Loading motor A motive power which drives the mechanism. It transmits the power to the master cam and cassette housing control assembly. |
| 9. | Main take-up brake lever Brakes the take-up reel disk to prevent tape slackening when the unit is stopped in fast forward or rewind mode. | | |

FUNCTION OF MAJOR MECHANICAL PARTS (BOTTOM VIEW)



| No. | Function | No. | Function |
|-----|--|-----|---|
| 1. | Slow brake lever Gets in contact with the capstan D.D. motor linking to the master cam in the slow still mode, and brakes it to a certain degree. | 6. | Reel pulley Transmits the power of the capstan D.D. motor to the reel disk via the reel idler. |
| 3. | Capstan D.D. motor A motive power which runs the tape. It transmits the power via the reel belt. | 8. | Shifter Transmits the operation of the master cam to break and loading gear. |
| 4. | Reel belt Transmits the power to run the tape to the reel pulley. | 9. | Take-up loading gear Shifts the take-up pole base and guide roller via the loading relay gear, and applies the tape around the drum assembly, as well as transmits the power to the supply loading gear. |

4. ADJUSTMENT, REPLACEMENT AND ASSEMBLY OF MECHANICAL UNITS







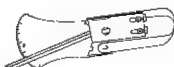


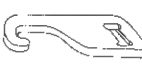
Here we will describe a relatively simple service work in the field, not referring to the more complicated repairs which would require the use of special equipment and tools (drum assembly replacement, for exam-



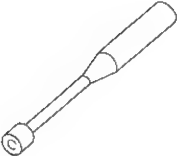

ple).

We are sure that the easy-to-handle tools listed below would be more than handy for periodical maintenance to keep the machine in its original working condition.

TOOLS NECESSARY FOR ADJUSTING THE MECHANICAL UNITS

The following tools are required for proper service and satisfactory repair.

| No. | Jig Item | Part No. | Code | Configuration | Remarks |
|-----|--------------------------------|--------------|------|--|--|
| 1 | Reel Disk Height Adjusting Jig | JiGRH0002 | BR |  | These Jigs are used for checking and adjusting the reel disk height. |
| 2 | Master Plane Jig | JiGMP0001 | BY |  | |
| 3 | A/C Head Tilt Adjusting Jig | 9DAACH-A323U | BX |  | This Jig is used for setting the A/C head tilt. |
| 4 | Torque Gauge (90g) | JiGTG0090 | CM |  | These Jigs are used for checking and adjusting the torque of take-up and supply reel disks. |
| | Torque Gauge (1.2kg) | JiGTG1200 | CN | | |
| 5 | Gauge Head | JiGTH0006 | AW |  | |
| 6 | Cassette Torque Meter | JiGVHT-063 | CZ |  | This cassette torque meter is used for checking and adjusting the torque of take-up for measuring tape back tension. |
| 7 | Tension Gauge (300g) | JiGSG0300 | BF |  | There are two gauges used for the tension measurements, 300 g and 2.0kg. |
| | Tension Gauge (2.0kg) | JiGSG2000 | BS | | |
| 8 | Hex Wrench (0.9mm) | JiGHW0009 | AE |  | These Jigs are used for loosening or tightening special hexagon type screws. |
| | Hex Wrench (1.2mm) | JiGHW0012 | AE | | |
| | Hex Wrench (1.5mm) | JiGHW0015 | AE | | |
| 9 | Alignment Tape (PAL) | VROCPSV | CK |  | These tapes are especially used for electrical fine adjustment. |
| | Alignment Tape (PAL) | VROUBZFS | | | |
| 11 | Tension Gauge Adapter | JiGADP003 | BK |  | This Jig is used with the tension gauge. Rotary transformer clearance adjusting jig. |

| No. | Jig Item | Part No. | Code | Configuration | Remarks |
|-----|------------------------------------|----------------|------|---|--|
| 12 | Special Bladed Screwdriver | JiGDRIVERH-4 | AP |  | This screwdriver is used for adjusting the guide roller height. |
| 14 | Torque Driver | JiGTD1200 | CB |  | This is used to screw down resinmade parts: the specified torque is 5kg. |
| 15 | Box Driver | JiGDRIVER110-7 | AS |  | This Jig is used for height adjustment of the A/C head and X-position. |
| | | JiGDRIVER110-4 | AV | | This Jig is used for replacement of the SI roller. |
| 16 | Reverse Guide Height Adjusting Jig | JiGRVGH-F18 | BU |  | This Jig is used for height adjustment of the reverse guide. |

MECHANICAL PARTS REQUIRING PERIODICAL INSPECTION

Use the following table as a guide to maintain the mechanical parts in good operating condition.

| Parts | Maintained | 500 hrs. | 1000 hrs. | 1500 hrs. | 2000 hrs. | Possible symptom encountered | Remarks |
|--|------------|--------------------------|----------------------------|--------------------------|----------------------------|--|--|
| Guide roller ass'y | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/> | Lateral noises Head occasionally blocked | Abnormal rotation or significant vibration requires replacement. |
| Supply impedance roller | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/> | | |
| Supply impedance roller (inner hole and shaft) | | | <input type="checkbox"/> | | <input type="checkbox"/> | | Clean with pure high quality isopropyl alcohol. |
| Supply impedance roller flange | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Retaining guide | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Clean tape contact part with the specified cleaning liquid. |
| Slant pole | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/> | | |
| Video head (upper drum ass'y) | | <input type="checkbox"/> | <input type="radio"/> | <input type="checkbox"/> | <input type="radio"/> | Poor S/N ratio, no colour | Clean tape contact area with the specified cleaning liquid. |
| Full-erase head | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/> | Poor colour, beating | |
| A/C head | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/> | Sound too small or distorted | |
| Lower drum ass'y | | | | | | Poor flatness of the envelope with alignment tape | |
| Capstan D.D. Motor | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/> | No tape running, uneven colour | |
| Pinch roller | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="radio"/> | No tape running, tape slack | Clean rubber and rubber contact area with the specified cleaning liquid. |
| Reel belt | | | <input type="checkbox"/> | | <input type="radio"/> | No tape running, tape slack, no fast forward/rewind motion | |
| Tension band ass'y | | | | | <input type="radio"/> | Cassette not loaded or unloaded | |
| Loading Motor | | | | | <input type="radio"/> | | |
| Reel idler ass'y | | | | | | No tape running | |
| Reel pully ass'y | | | <input type="checkbox"/> △ | | <input type="checkbox"/> ○ | | |
| Clutch gear ass'y | | | | | <input type="radio"/> | | |
| Main supply/take-up brake levers | | | | | <input type="radio"/> | Tape slack | |

NOTE: ○: Part replacement.
☐: Cleaning (For cleaning, use a lint-free cloth dampened with pure isopropyl alcohol).
 △: Oil refilling (The indicated point should be lubricated with high quality spindle oil every 1000hrs).

If the reading is out of the specified value, clean or replace the part.

REMOVAL AND REASSEMBLY OF CASSETTE HOUSING CONTROL ASSEMBLY

• Removal

1. Set the cassette ejected condition in the cassette eject mode.
2. Unplug the recorder from the main source.
3. Follow the procedures below in the specified order.
 - a) Remove the cassette housing installation screws ① and ②.
 - b) Slide and pull out the cassette housing control assembly upward.

• Reassembly

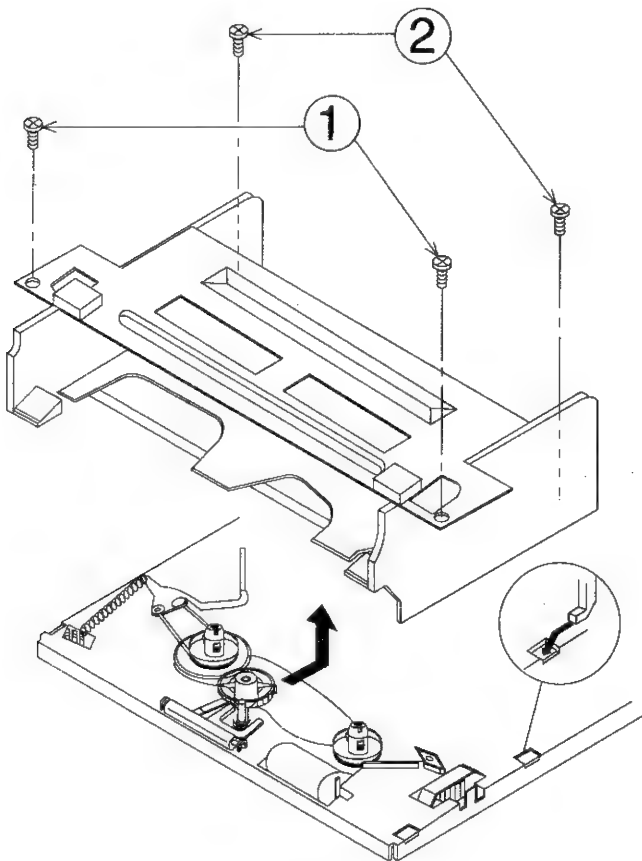


Figure 4-1.

1. Before installation of the cassette housing control assembly, make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Plug in the power cord. The cassette control drive gear starts and stops just when a tally mark appears in the mechanism chassis window. Align this tally mark with the cassette control drive angle's mark, as shown in Fig. 4-2, to position the cassette control on the mechanism chassis.
2. Follow the procedures for removal in the reverse order.

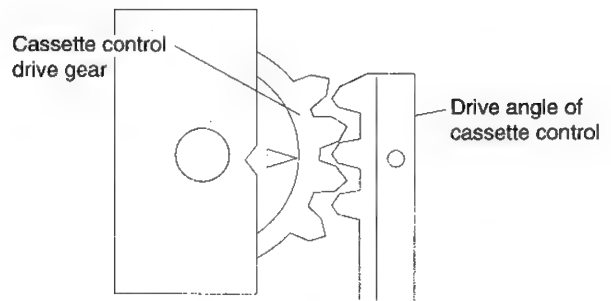


Figure 4-2.

Notes:

- ① In using a magnet screw driver, be sure to keep it away from the A/C head, FE (Full Erase) head, or the drum.
- ② In removal and reassembly, take care not to hit the cassette housing control assembly or tools against the guide pin, drum, or the like thereabout.
- ③ Load the cassette once onto the cassette housing control assembly after reassembly.

TO RUN A TAPE WITHOUT THE CASSETTE HOUSING CONTROL ASSEMBLY

1. Be sure to make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor, before turning on the power.
2. Plug in the power cord.
3. Turn on the power switch.
4. Open the lid of a cassette tape by hand.
5. Hold the lid with two pieces of vinyl tape.
6. Set the cassette tape in the mechanism chassis.
7. Stabilize the cassette tape with a weight (500g) to prevent floating.
8. Perform running test.

Note:

The weight should not be more than 500g.

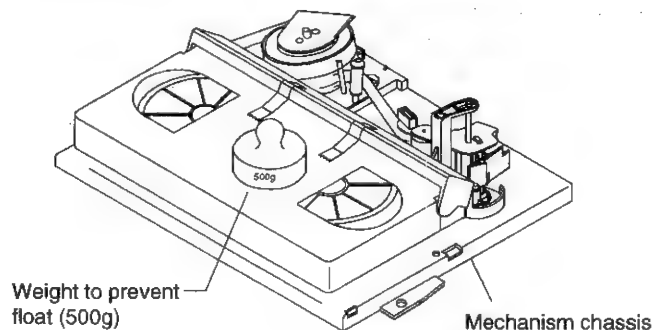


Figure 4-3.

REPLACEMENT AND HEIGHT CHECKING AND ADJUSTMENT OF REEL DISKS

• Removal (Supply and Take-up reel disks)

1. Remove the cassette housing control assembly.
2. Pull the tension band out of the tension arm.
3. Remove the supply main brake and the take-up main brake.
4. Open the hook at the top of the reel disk, and remove the reel disk.

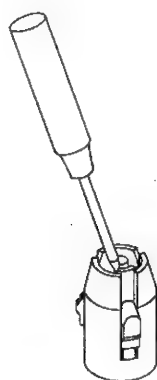
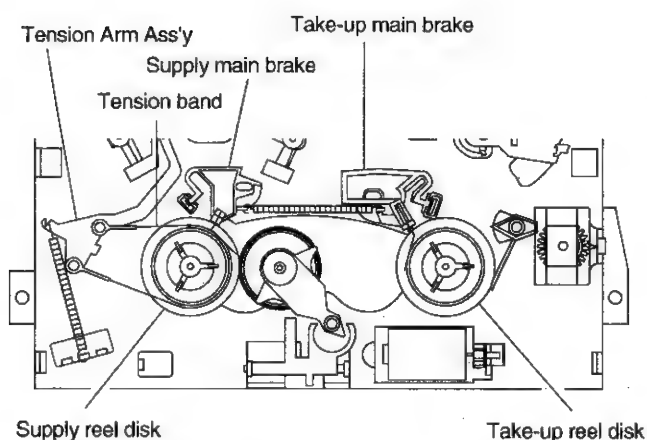


Figure 4-4.

Note:

When the tension band is pressed in the direction of the arrow for removal, the catch is hard to be deformed.



Figure 4-5.

• Reassembly (Supply reel disk)

1. Clean the reel disk shaft and apply oil to it.
2. Install a new supply reel disk onto the shaft.
3. Replace the tension band around the supply reel disk, and insert it to the hole of the tension arm.
4. Check the reel disk height and reassemble the supply main brake.

Notes:

- ① Take enough care not to deform the tension band during installation of the supply reel disk.
- ② Be careful not to damage the supply main brake.

• Reassembly (Take-up reel disk)

1. Clean the reel disk shaft and apply oil to it.
2. Install a new take-up reel disk onto the shaft.
3. Check the reel disk height and reassemble the take-up main brake.

Note:

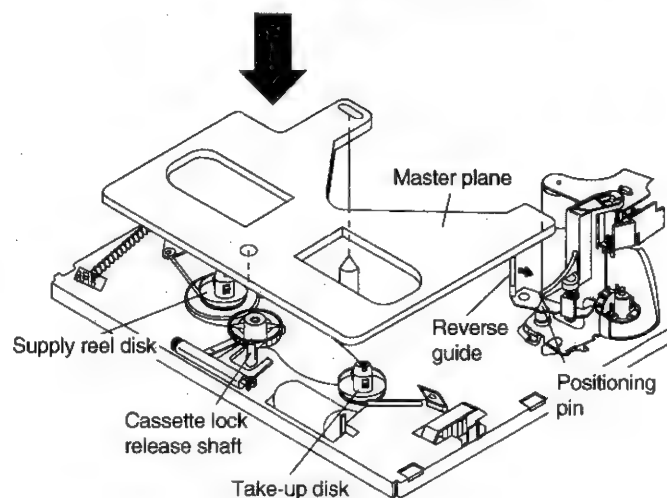
Take care not to damage the take-up main brake.

- * After reassembly, check the video search rewind back tension (see page 18), and check the brake torque (see page 21).

• Height checking and adjustment

Note:

Place the master plane onto the mechanism unit, taking care not to hit the drum (see Figure 4-6).



Set the master plane releasing the reverse guide by a finger.

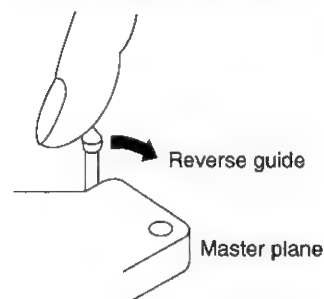


Figure 4-6.

- Check that the reel disk is lower than part A but higher than part B. If the height is not correct, readjust the reel disk height by changing the poly-slider washer under the reel disk.

Note:

Whenever replacing the reel disk, perform the height checking and adjustment.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN FAST FORWARD MODE

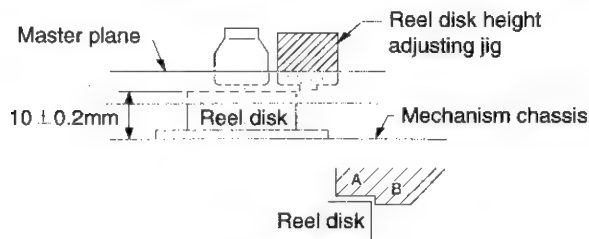


Figure 4-7.

- **Remove the cassette housing control assembly.**
- **Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.**
- **Setting**
 1. Set a torque gauge to zero on the scale. Place it on the take-up reel disk.
 2. Press the FF button to set the mechanism to the fast forward mode.
- **Checking**
 1. Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by hand in the take-up direction.
 2. Check to see if the take-up torque is higher than 69 mN•m (700 gf•cm).

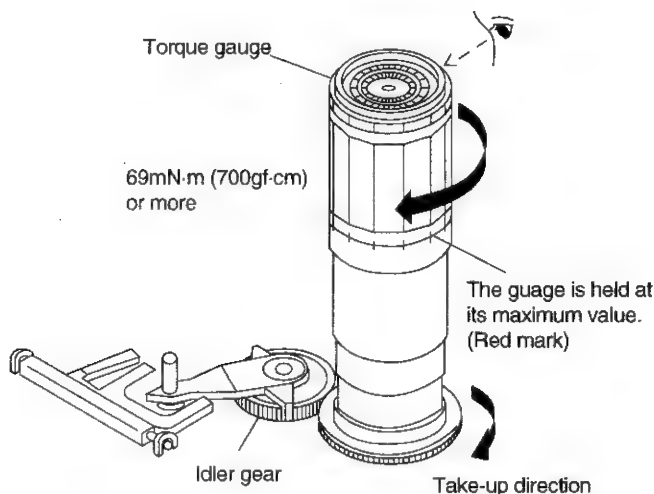


Figure 4-8.

- **Adjustment**

1. If the take-up torque is outside the range, clean the capstan D.D. motor pulley, reel belt and reel pulley with cleaning liquid, then recheck the torque.
2. If the take-up torque is still out of range, replace the reel belt.

Notes:

1. Hold down the torque gauge so that it may not fly off.
2. When checking the take-up torque, do not keep the reel disk locked for a longer time.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN REWIND MODE

- **Remove the cassette housing control assembly.**
- **Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.**
- **Setting**
 1. Set a torque gauge to zero on the scale. Place it on the supply reel disk.
 2. Press the REW button to set the mechanism to the rewind mode.
- **Checking**
 1. Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by hand in the take-up direction.
 2. Check to see if the take-up torque is higher than 69 mN•m (700 gf•cm).
- **Adjustment**

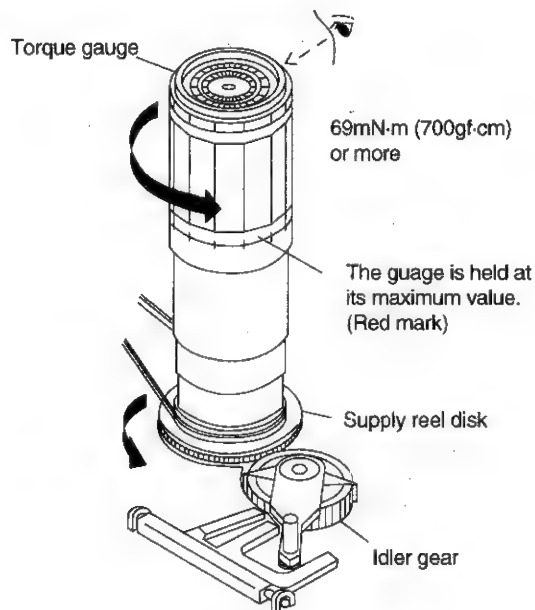


Figure 4-9.

1. If the take-up torque is outside the range, clean the capstan D.D. motor pulley, reel belt and reel pulley with cleaning liquid, then recheck the torque.
2. If the take-up torque is still out of range, replace the reel belt.

Notes:

1. Hold down the torque gauge so that it may not fly off.
2. When checking the take-up torque, do not keep the reel disk locked for a longer time.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN PLAYBACK MODE

1. Remove the cassette housing control assembly.
2. Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.
3. Open the lid of the cassette torque meter, and hold it with two pieces of vinyl tapes.
4. Load the cassette torque meter into the unit.
5. Put the weight (500g) on the cassette torque meter.
6. Press the REC button to put the unit in REC mode.

Set value SP $8.8 \pm 3.8 \text{ mN}\cdot\text{m}$ ($90 \pm 39 \text{ gf}\cdot\text{cm}$)

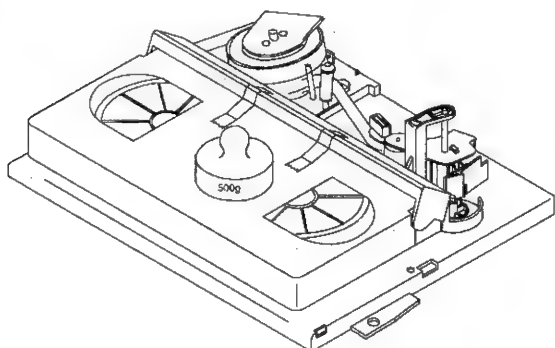


Figure 4-10.

• **Checking**

1. Check that the torque is in the range of $8.8 \pm 3.8 \text{ mN}\cdot\text{m}$ ($90 \pm 39 \text{ gf}\cdot\text{cm}$).
2. The torque fluctuates due to the rotational deviation of the reel pulley ass'y. Use the center of the fluctuation as the value.
3. Place the ass'y in the SP record mode, and check that the take-up torque is within the range.

• **Adjustment**

If the take-up torque in the playback mode is outside the range, replace the reel pulley ass'y.

Note:

Stabilize the cassette torque meter to prevent floating.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN VIDEO SEARCH REWIND MODE

- Remove the cassette housing control assembly.
- Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

• **Setting**

1. Push the PLAY button to place the ass'y in the playback mode.
2. Push the REW button to place the ass'y in the video search rewind mode.

• **Checking**

1. Place the torque gauge on the supply reel disk, and turn it counterclockwise very slowly (one rotation every 1 to 2 seconds) and check that the torque is within the set value $14.5^{+8}_{-6} \text{ mN}\cdot\text{m}$ ($148^{+80}_{-60} \text{ gf}\cdot\text{cm}$)

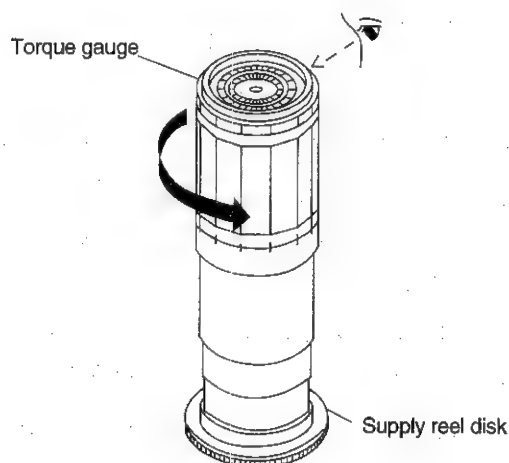


Figure 4-11.

Note:

Set the torque gauge securely on the supply reel disk. If it is not secure, the measurement will be incorrect.

• **Adjustment**

If the take-up torque in video search rewind mode is outside the range, replace the reel pulley ass'y.

Note:

The torque fluctuates due to the rotational deviation of the reel pulley ass'y. Use the center of the fluctuation at the value.

CHECKING THE FAST FORWARD BACK TENSION

- Remove the cassette housing control assembly.
- Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

• Checking

1. Push the FF button to place the ass'y in the fast forward mode.
2. Place the torque gauge on the supply reel disk, and turn it clockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is $1.5 \pm 0.9 \text{ mN}\cdot\text{m}$ ($15 \pm 9 \text{ gf}\cdot\text{cm}$).

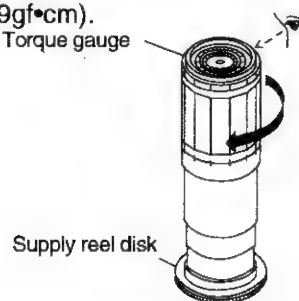


Figure 4-12.

Notes:

- ① Set the torque gauge securely on the supply reel disk. If the torque gauge is not securely set on the reel disk, measurement will be incorrect.
- ② Measure the torque with the torque gauge's weight exerted on the reel disk.

CHECKING THE REWIND BACK TENSION

- Remove the cassette housing control assembly.

- Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

• Checking

1. Push the REW button to place the ass'y in the rewind mode.
2. Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is $1.3 \pm 0.8 \text{ mN}\cdot\text{m}$ ($13 \pm 8 \text{ gf}\cdot\text{cm}$).

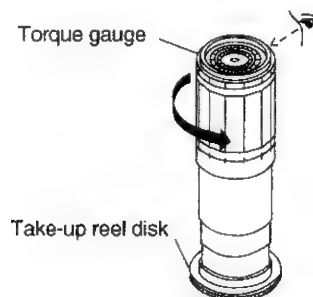


Figure 4-13.

Notes:

- ① Set the torque gauge securely on the take-up reel disk. If it is not secure, the measurement will be incorrect.
- ② Measure the torque with the torque gauge's weight exerted on the reel disk.

CHECKING THE VIDEO SEARCH REWIND BACK TENSION

- Remove the cassette housing control assembly.

- Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

• Checking

1. Push the PLAY button to place the ass'y in the playback mode.
2. Push the rewind button to place the ass'y in the video search rewind mode.
3. Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within the set value $4 \pm 1.7 \text{ mN}\cdot\text{m}$ ($41 \pm 17 \text{ gf}\cdot\text{cm}$).

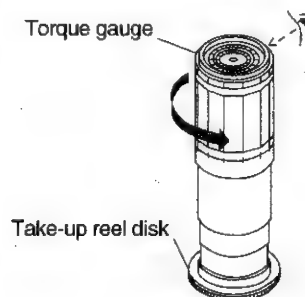


Figure 4-14.

Notes:

- ① Set the torque gauge securely on the take-up reel disk. If it is not secure, the measurement will be incorrect.
- ② Measure the torque with the torque gauge's weight not exerted on the reel disk.

CHECKING THE PINCH ROLLER PRESSURE

- Remove the cassette housing control assembly.

- Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

• Checking

Push the PLAY button to place the ass'y in the playback mode.

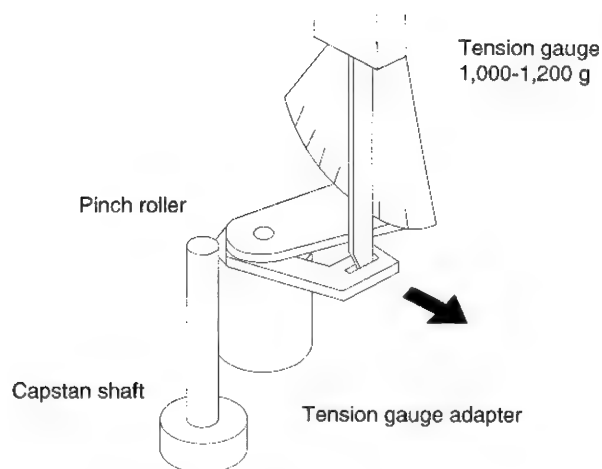


Figure 4-15.

1. Detach the pinch roller from the capstan shaft.
2. Set the tension gauge by hooking the tension gauge adapter onto the pinch roller shaft.
3. Gradually release the pressure to allow the pinch roller to touch the capstan shaft. When the pinch roller just touches the capstan shaft, read the indication on the gauge.
4. Check that the reading of the tension gauge is in the range of 900 to 1200 g.

CHECKING AND ADJUSTMENT OF TENSION POLE POSITION

- Remove the cassette housing control assembly.

- Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

Setting

1. Open the lid of cassette tape (E-180), and hold it with two pieces of vinyl tapes.
2. Load the cassette tape into the unit.
3. Put the weight (500g) on the cassette tape.
4. Make the adjustment with the beginning of a E-180 tape.

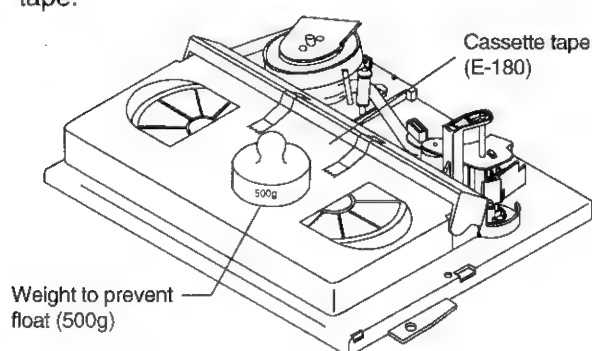


Figure 4-16.

Checking

1. Set a cassette tape, press the REC button and get the tape loaded. Now check the tension pole position.

2. Visually check to see if the left end of the tension pole is in alignment with the line 0.2 mm left of the center line of the SI roller. Readjust as required in the following steps.

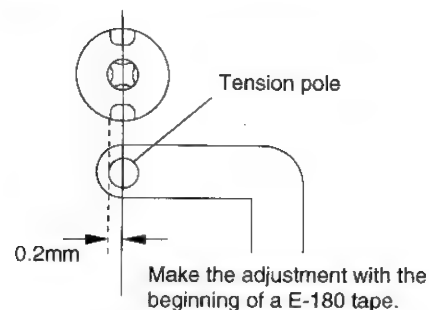


Figure 4-17.

- ① If the end is at the left from the dotted line:

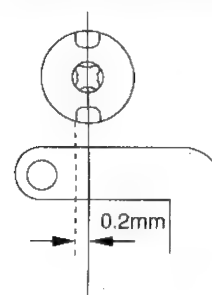


Figure 4-18.

1. Remove the cassette and press the REC button to make an empty loading. Put a bladed screwdriver into the tension band positioning cam and turn it clockwise.
2. Place the cassette in position and check the tension pole position.

- ② If the end is at the right from the dotted line:

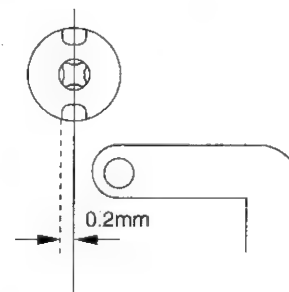


Figure 4-19.

1. Remove the cassette and press the REC button to make an empty loading. Put a bladed screwdriver into the tension band positioning cam to turn it counter-clockwise.
2. Place the cassette in position and check the tension pole position.

Notes:

- ① The tension band positioning cam cannot be adjusted with a cassette in place because the cam will be located below the cassette. Repeat a series of steps; empty loading, adjustment, cassette placement and position checking.
- ② Turn the positioning cam clockwise to move the tension pole to the right (in the black-arrow direction). Turn it counterclockwise to move the tension pole to the left (in the white-arrow direction).

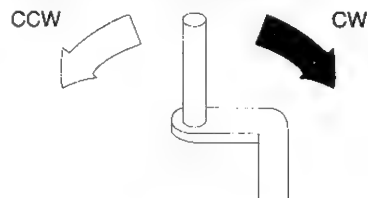


Figure 4-20.

- ③ Adjustable range of the tension pole positioning cam.

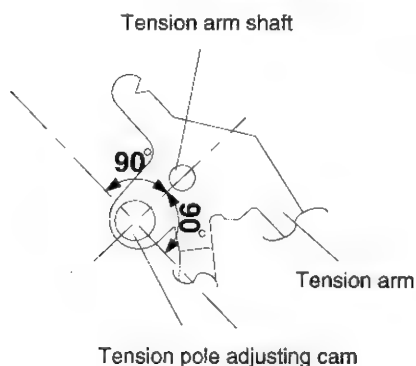


Figure 4-21.

Adjust the tension pole positioning cam so that the arrow mark on the cam be within 90° left and right from the tension arm shaft's center.

CHECKING AND ADJUSTMENT OF RECORD/PLAYBACK BACK TENSION

- Remove the cassette housing control assembly.
- Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.
- **Setting**
 1. Open the lid of the cassette torque meter, and hold it with two pieces of vinyl tapes.
 2. Load the cassette torque meter into the unit.
 3. Put the weight (500g) on the cassette torque meter.

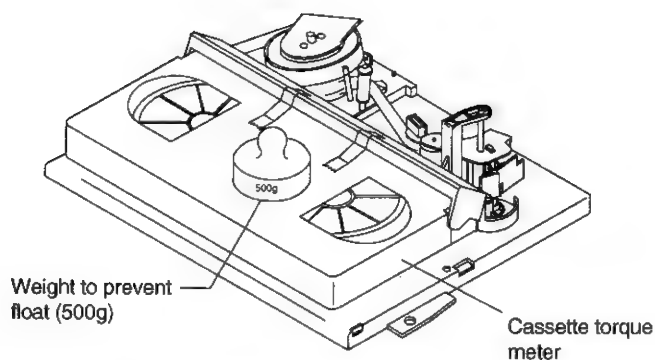


Figure 4-22.

- **Checking**

1. Push the REC button to place the unit in the record mode.
2. Check that the back tension indicated by the gauge is within the set range 31 to 38 g•cm.

- **Notes:**

1. Make sure that the video cassette tape is over the retaining guide.
2. Make sure that the tape is not slack nor damaged at either end.

- **Adjustment**

1. If the reading of the cassette torque meter is less than specified, move the tension spring hook toward A.
2. If the reading of the cassette torque meter is more than specified, move the tension spring hook toward B.

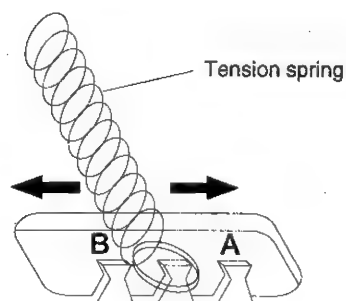
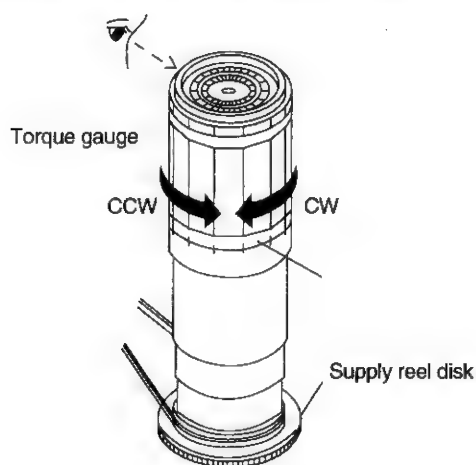


Figure 4-23.

CHECKING THE BRAKE TORQUE

• Checking the brake torque at the supply side



| | |
|------|--------------------------|
| CCW: | 5~15mN·m (50~150gf·cm) |
| CW: | 10~32mN·m (102~326gf·cm) |

Figure 4-24.

• Remove the cassette housing control assembly.

- Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

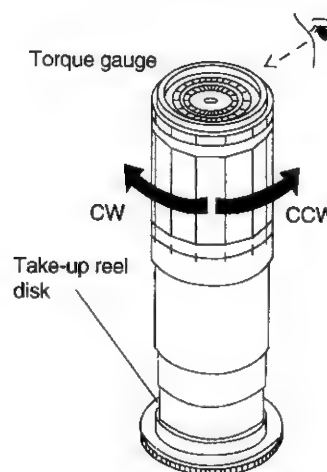
• Setting

1. Set a torque gauge to zero on the scale. Place it on the supply reel disk.
2. Switch from the FF mode to the STOP mode.
3. Disconnect the AC power plug.

• Checking

1. Slowly rotate the torque gauge in the clockwise (CW) direction and counterclockwise (CCW) direction of the supply brake so that the reel disk and the indicator of the torque gauge rotate at an equal rate. Check that the values are within the range of CW direction = 10~32mN·m (102~326gf·cm), CCW direction = 5~15mN·m (50~150gf·cm), and that the brake torque in the CW direction is at least twice as high as that in the CCW direction.

• Checking the brake torque at the take-up side



| | |
|------|--------------------------|
| CCW: | 10~32mN·m (102~326gf·cm) |
| CW: | 5~15mN·m (50~150gf·cm) |

Figure 4-25.

• Remove the cassette housing control assembly.

- Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

• Setting

1. Set a torque gauge to zero on the scale. Place it on the take-up reel disk.
2. Switch from the FF mode to the STOP mode.
3. Disconnect the AC power plug.

• Checking

1. Slowly rotate the torque gauge in the clockwise (CW) direction and counterclockwise (CCW) direction of the take-up brake so that the reel disk and the indicator of the torque gauge rotate at an equal rate. Check that the values are within the range of CCW direction = 10~32mN·m (102~326gf·cm), CW direction = 5~15mN·m (50~150gf·cm), and that the brake torque in the CCW direction is at least twice as high as that in the CW direction.

• Adjustment of the brake torque at the supply side and the take-up side

1. If the supply or take-up brake torque is outside the range, clean the supply or take-up reel disk break lever pad, then recheck the torque.
2. If the supply or take-up brake torque is still outside the range, replace the main brake ass'y or the main brake spring.

Note:

When the main brake is replaced, perform the height checking and adjustment of reel disks (see page 15), and the brake torque checking.

REPLACEMENT OF A/C (Audio/Control) HEAD

1. Remove the cassette housing control assembly.
2. Place the unit in the unloading mode, and unplug the power cord.

• Removal

1. Loosen the tilt adjusting screw ①
2. Remove the azimuth adjusting screw ②.
3. Remove the A/C head screw ③.
4. Unsolder the A/C head PWB soldered to the A/C head assembly.

Notes:

1. After replacement, be sure to perform the adjustment of the tape drive train (see page 24). Under any circumstances, avoid touching the head. Clean the head, if touched with your finger, with alcohol.
2. Take care that the azimuth spring does not fly off when removing the A/C head screw.

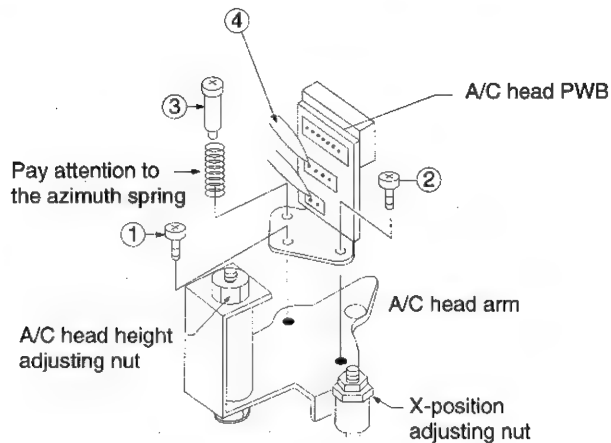


Figure 4-26.

• Replacement

1. Solder the removed A/C head PWB onto a new A/C head assembly.
2. The A/C head assembly is attached so that the A/C head arm and A/C head plate are roughly parallel to each other.

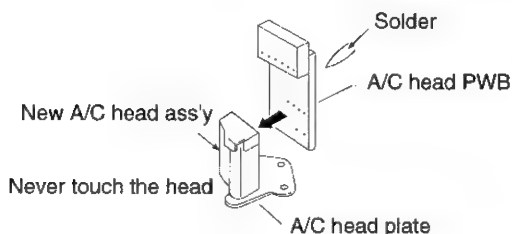


Figure 4-27.

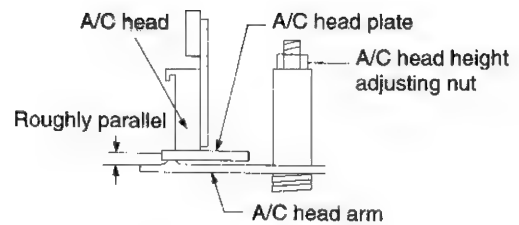
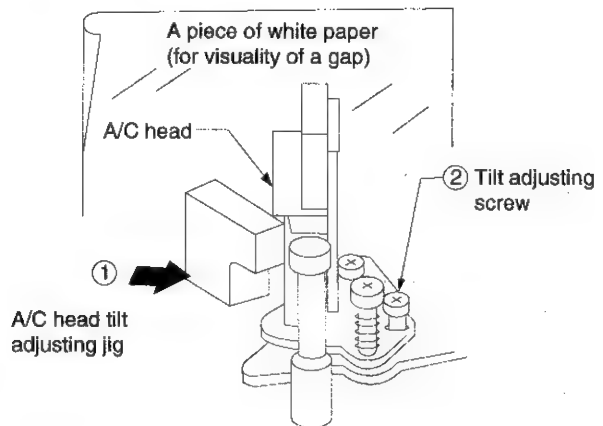


Figure 4-28.

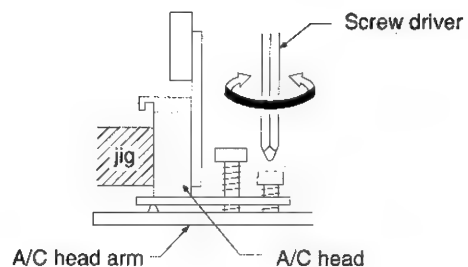
• Adjustment

[A/C head tilt angle]

1. Set the mechanism to the loading mode.
2. Place the A/C head tilt adjusting Jig ①.
3. Slowly turn the tilt adjusting screw ② with a screw driver until there is no gap between the Jig and the A/C head.

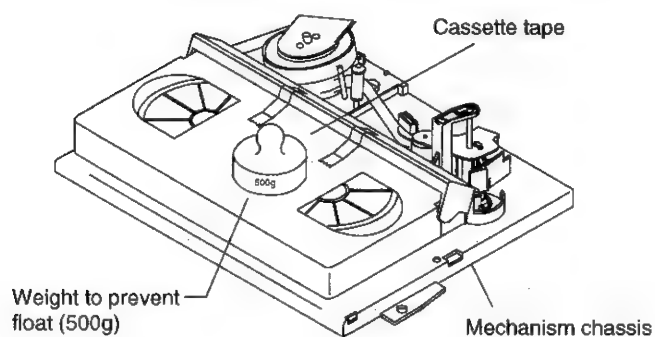
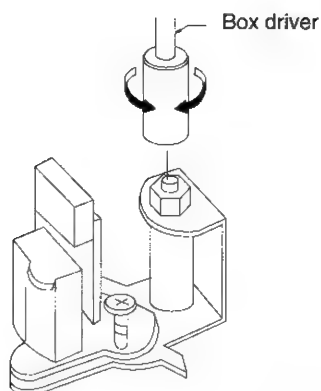


(a)

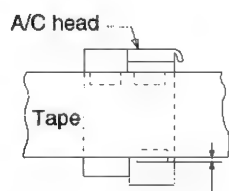


(b)

Figure 4-29.

[A/C head height rough adjustment]• **Setting**

- ① Roughly adjust the height of the A/C head by turning the A/C head adjusting hexagon nut with the specialized box driver until the tape is in the position shown below.
- ② Set the cassette tape to the mechanism chassis.
- ③ Press the PLAY button to put the unit in the playback mode.

• **Adjustment**

Adjust the nut visually so that the control head is visible 0.3 to 0.5mm below the bottom of the tape.

Figure 4-30.

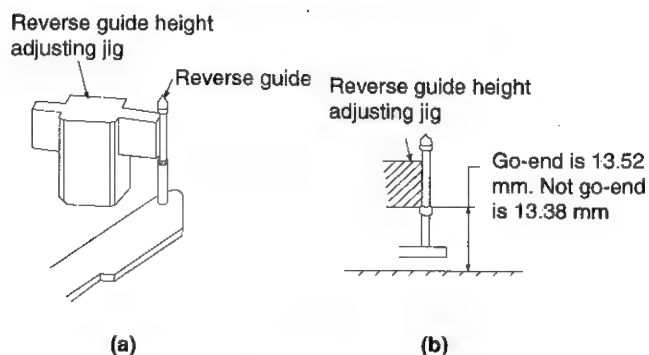
HEIGHT ADJUSTMENT OF REVERSE GUIDE**[Height adjustment of reverse guide]**

Figure 4-31.

1. In the tape load mode, make adjustment at the 13.38mm side first and then rotate the height adjusting nut by 1/6 turn counterclockwise.
2. Actually load the unit with a tape, put it in the play mode, and make sure the tape is free from wrinkles near the reverse guide.
3. Use a commercially available box driver to turn the height adjusting nut.

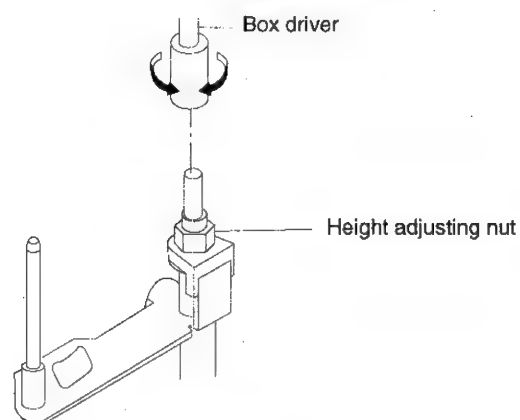


Figure 4-32.

ADJUSTMENT OF TAPE DRIVE TRAIN

1. Remove the cassette housing control assembly.
2. Make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.
3. Check and adjust the position of the tension pole. (See page 19.)
4. Check and adjust the video search rewind back tension. (See page 18.)
5. Set the tilt angle of the A/C head. (See page 22.)
6. Rough adjustment of tape drive train.

- a) Connect the oscilloscope to the test point for PB CHROMA envelope output (TP301). Set the synchronism of the oscilloscope to EXT. The PB CHROMA signal is to be triggered by the head switching pulse (TP302).
- b) Loosen the setscrew at the lower part of the guide roller, and adjust it with an adjusting screw driver (JIGDRIVERH-4) so that the guide roller turns smoothly. (Do not overloosen the setscrew, which causes insecurity of the guide roller.) (See Figure 4-33.)
- c) Set the alignment tape (monoscope pattern) on the reel disk, and place the unit in the playback mode. (Place a 500 g weight on the cassette tape to prevent floating of the cassette tape.)

- d) In the X value adjustment mode (see the Electrical

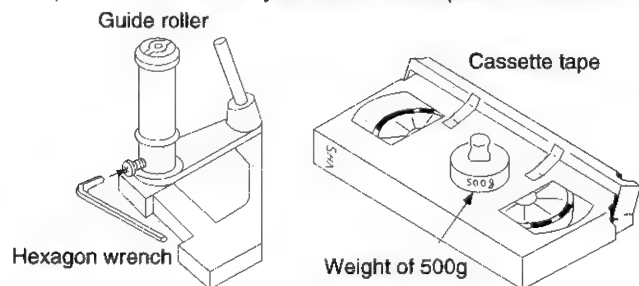
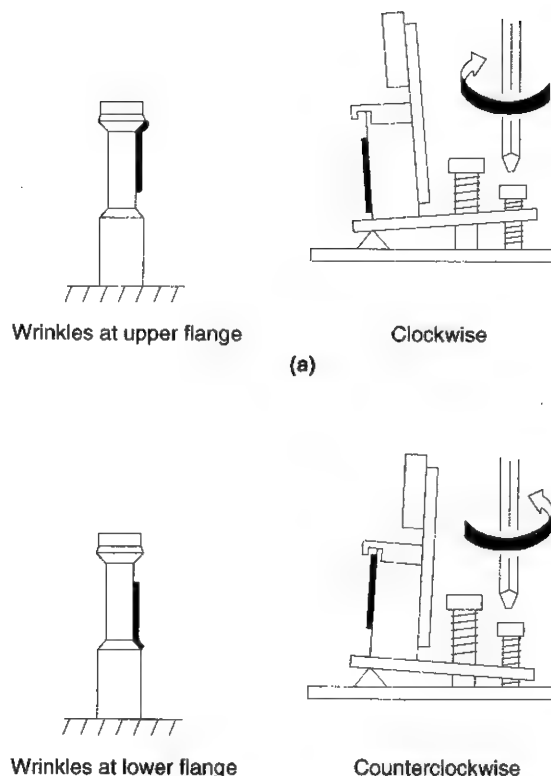


Figure 4-33.

Figure 4-34.

Adjustment), change the envelope waveform from MAX to MIN, and MIN to MAX by pushing the (+) or (-) tracking button, and check a flat response is obtained on the waveform.

- e) If a flat response cannot be obtained, roughly adjust the guide rollers on the supply side and take-up side using an adjusting screw driver until a flat response can be obtained.
- f) Turn the A/C head tilt adjusting screw with a screwdriver to prevent the tape from wrinkling at the upper and lower flanges of the fixed guide.
 - 1) Wrinkles at the upper flange : Turn the above adjusting screw clockwise, as shown in Figure 4-35 (a).
 - 2) Wrinkles at the lower flange : Turn the above adjusting screw counterclockwise, as shown in Figure 4-35 (b).

(b)
Figure 4-35.

Notes:

1. Place the tracking control in the center position, and adjust the X-position adjusting nut so that the PB CHROMA envelope becomes maximum for easier rough adjustment of the tape drive train.
2. In the rough adjustment, pay particular attention to the outlet side.

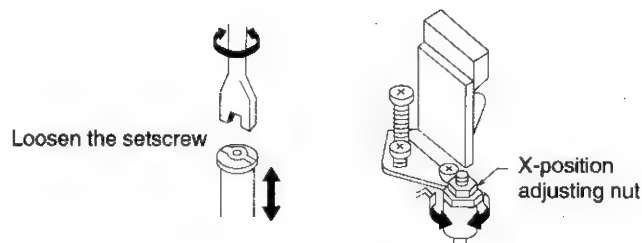


Figure 4-36.

Figure 4-37.

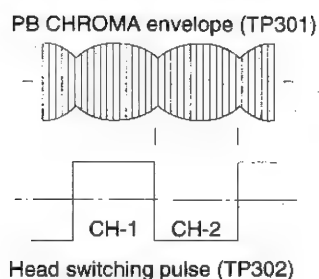


Figure 4-38.

7. Adjustment of A/C head height and azimuth

- Connect an oscilloscope to the audio output terminal.
- Use the alignment tape and play back its audio 6 kHz signal (monoscope pattern for video signal). Adjust the azimuth adjusting screw to obtain the maximum audio output on an oscilloscope. (See Figure 4-39.)
- Use the alignment tape and play back its audio 1 kHz signal (colour bar for video signal) and slowly rotate the A/C head height adjusting nut with the special box driver to obtain the maximum audio output.
- Perform the adjustment in b) again.
- After this adjustment, apply glyptal to the screws and nuts to fix them.

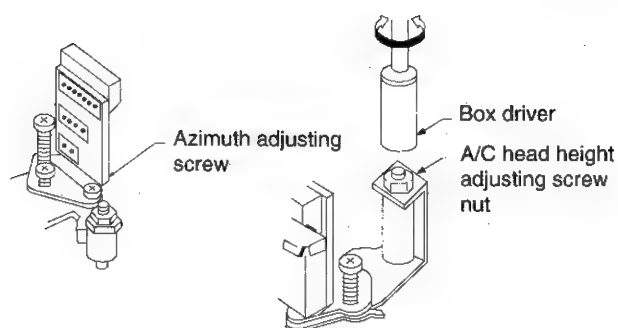


Figure 4-39.

Figure 4-40.

8. Adjustment of tape drive train and X-Position.
(Use the Alignment tape VROUBZFS.)

- Connect the oscilloscope to the test points (TP301) for PB CHROMA envelope output. Set the synchronism of the oscilloscope to EXT. The PB CHROMA signal is to be triggered by the head switching pulse (TP302).
- Play the tape drive train alignment tape.
- Push the (+) or (-) button to change the envelope waveform from MAX to MIN, and MIN to MAX. Adjust the guide roller's height on the supply and take-up sides with an adjusting screw driver, to obtain an envelope waveform that is as flat as possible.
- If the tape is above or below the helical lead, the PB CHROMA waveform will take the shape shown in Figure 4-41.
- Adjust for maximum flatness of the envelope as the step 6, e) in page 24.
- Push the (+) or (-) tracking button to check that a flat response is obtained on the envelope waveform.

| | When the tape is above the helical lead. | | When the tape is below the helical lead. | |
|------------|--|---|--|--|
| | Supply side | Take-up side | Supply side | Take-up side |
| | | | | |
| | | | | |
| Adjustment | Supply side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope. | Take-up side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope. | Supply side guide roller rotated in counterclockwise direction (raises guide roller) to make the tape float above the helical lead. The supply side guide roller is then rotated in the clockwise direction to flatten the envelope. | Take-up side guide roller rotated in counterclockwise direction (raises guide roller) to make the tape float above the helical lead. The take-up side guide roller is then rotated in the clockwise direction to flatten the envelope. |

Figure 4-41.

- g) Secure the guide roller by tightening the guide roller setscrew in the unloading mode.
 - h) Play back the tape drive train alignment tape to check that the envelope waveform does not change.
9. Adjustment of A/C head X-position.
- a) In the X value adjustment mode (see the Electrical Adjustment), make a short-circuit between TP5005 and TP5006, both located at the center on your side on the main PWB, with a 22 ohm resistor to center the tracking.
 - b) Rotate the X-position adjusting nut with an adjusting box driver, and adjust the A/C head position for maximum head switching pulse low side envelope.
 - c) Adjust the playback switching point.
 - d) Check the flatness of the envelope waveform and sound by playing back a recorded tape.

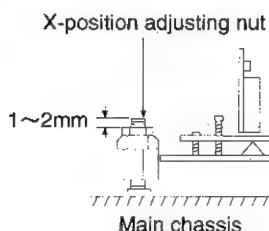


Figure 4-42.

REPLACEMENT OF THE CAPSTAN D.D. (DIRECT DRIVE) MOTOR

- Remove the cassette housing control assembly.

- Removal (Follow the order of indicated numbers.)

1. Disconnect from the board-to-board connector on the main PWB.
2. Remove the reel belt ①.
3. Remove the screws ②.

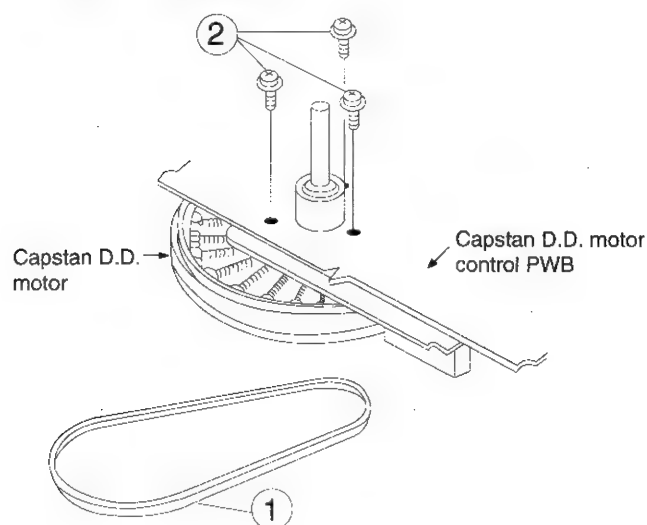


Figure 4-43.

• Reassembly

1. Mount the capstan motor on the mechanism chassis making sure not to allow the capstan shaft to hit the mechanism chassis, and attach it with the three screws.
2. Attach the reel belt. Reconnect to the board-to-board connector on the main PWB.

Notes:

1. After installing the capstan D.D. motor, be sure to rotate the capstan D.D. motor and check the movement.
2. Check the servo circuit.

REPLACEMENT OF DRUM D.D MOTOR

1. Put the unit in the cassette eject position.
2. Unplug the power cord.

• Removal (Reverse the order in reassembly.)

1. Disconnect the FFC cable ①.
2. Unscrew the stator assembly fixing screws ②.
3. Take out the stator assembly ③.
4. Unscrew the rotor assembly fixing screws ④.
5. Take out the rotor assembly ⑤.

Notes:

1. In removing the stator assembly, part of the drum earth spring pops out of the pre-load collar. Be careful not to lose it.
2. Secure the rotor assembly so that the installation positioning holes in the rotor assembly and upper drum assembly match. (Match the upper drum's notch with the rotor's hole.)
3. Be careful not to damage the upper drum or the video head.
4. Be sure that the hall device and the stator assembly are not damaged by the rotor assembly or other parts.
5. After installation, adjust the playback switching point.

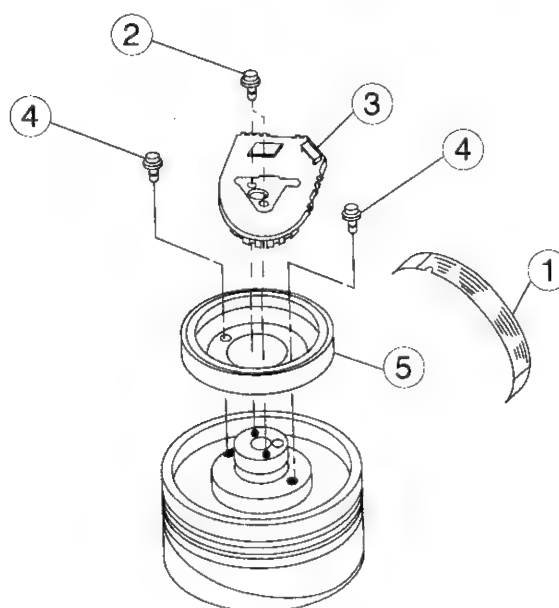


Figure 4-44.

ASSEMBLE THE MECHANISM'S PARTS REQUIRING THE PHASE MATCHING IN THE STEPS BELOW.

1. Assembling the pinch roller assembly and the pinch drive cam (on the front of the mechanism chassis).
2. Mounting the shifter (on the back of the mechanism chassis).
3. Mounting the master cam (on the back of the mechanism chassis).
4. Mounting the connection gear, slow brake and loading motor assemblies (on the back of the mechanism chassis).

1. Assembling the pinch roller assembly and the pinch drive cam (on the front of the mechanism chassis).

Place the following parts in position in numerical order.

- (1) Pinch drive cam ①
- (2) Pinch roller and pinch double-action lever ②
- (3) Open lever ③

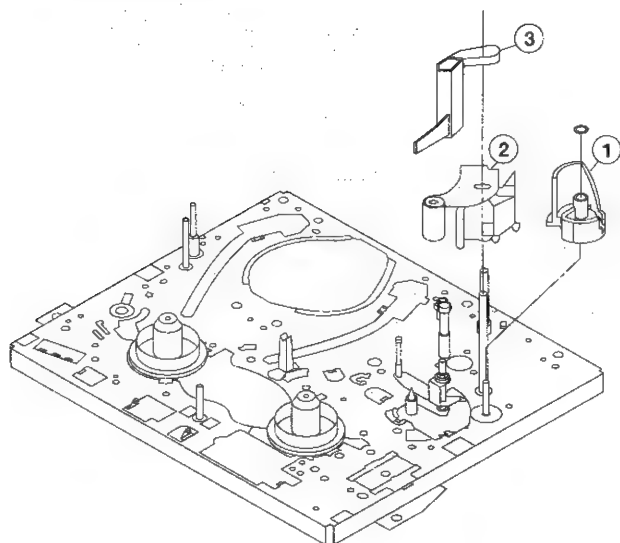
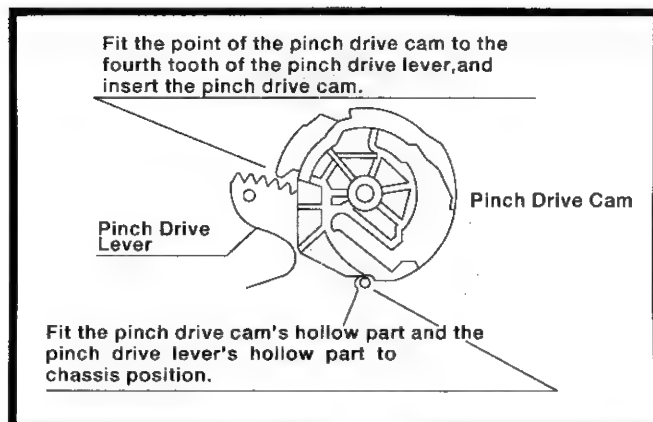


Figure 4-45.

① Insert Pinch Drive Cam.



Phase Matching Point ①

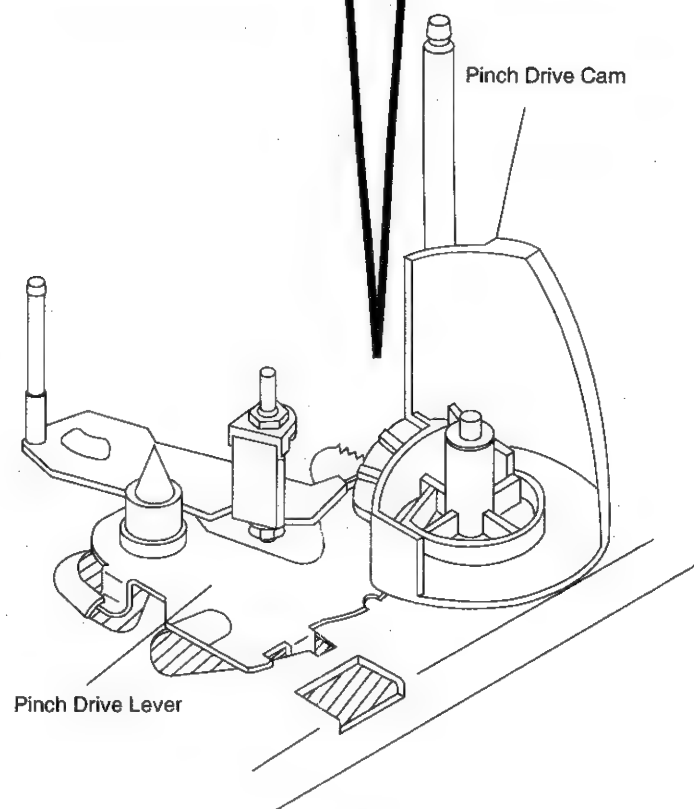


Figure 4-46-1.

② Insert Pinch Roller/Pinch Double Action Lever Ass'y.

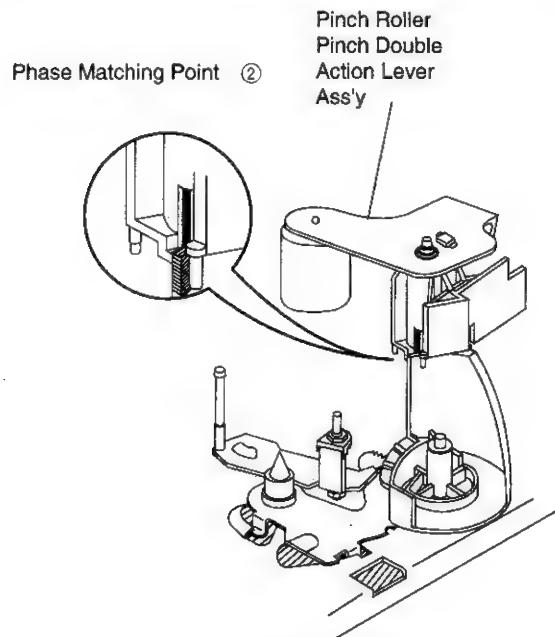


Figure 4-46-2.

③ Insert Open Lever.

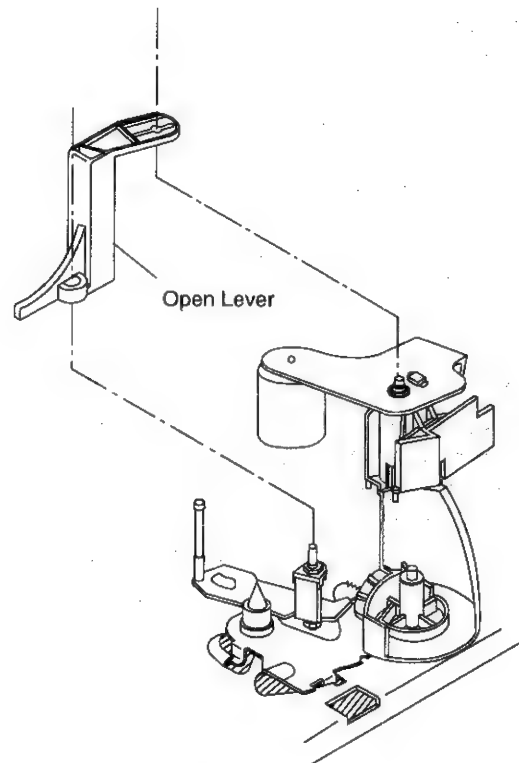


Figure 4-46-3.

2. Mounting the shifter (on the back of the mechanism chassis).

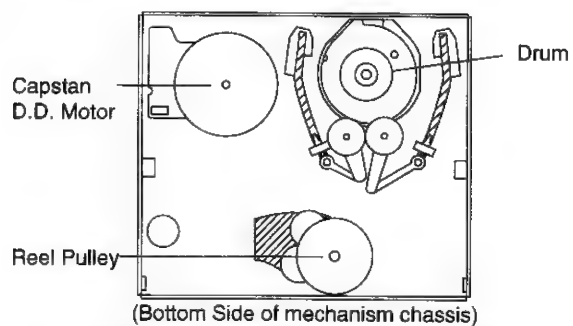


Figure 4-47.

1. Make sure that the loading gear is at the point (1) as shown below.
2. Place the shifter in position, keeping in mind the 7 insertion points and the five relief points.
3. For the phase matching at the insertion point (1), see the point (2) as shown below.
4. Finally fix the shifter with two washers located on insert points ① and ⑥.

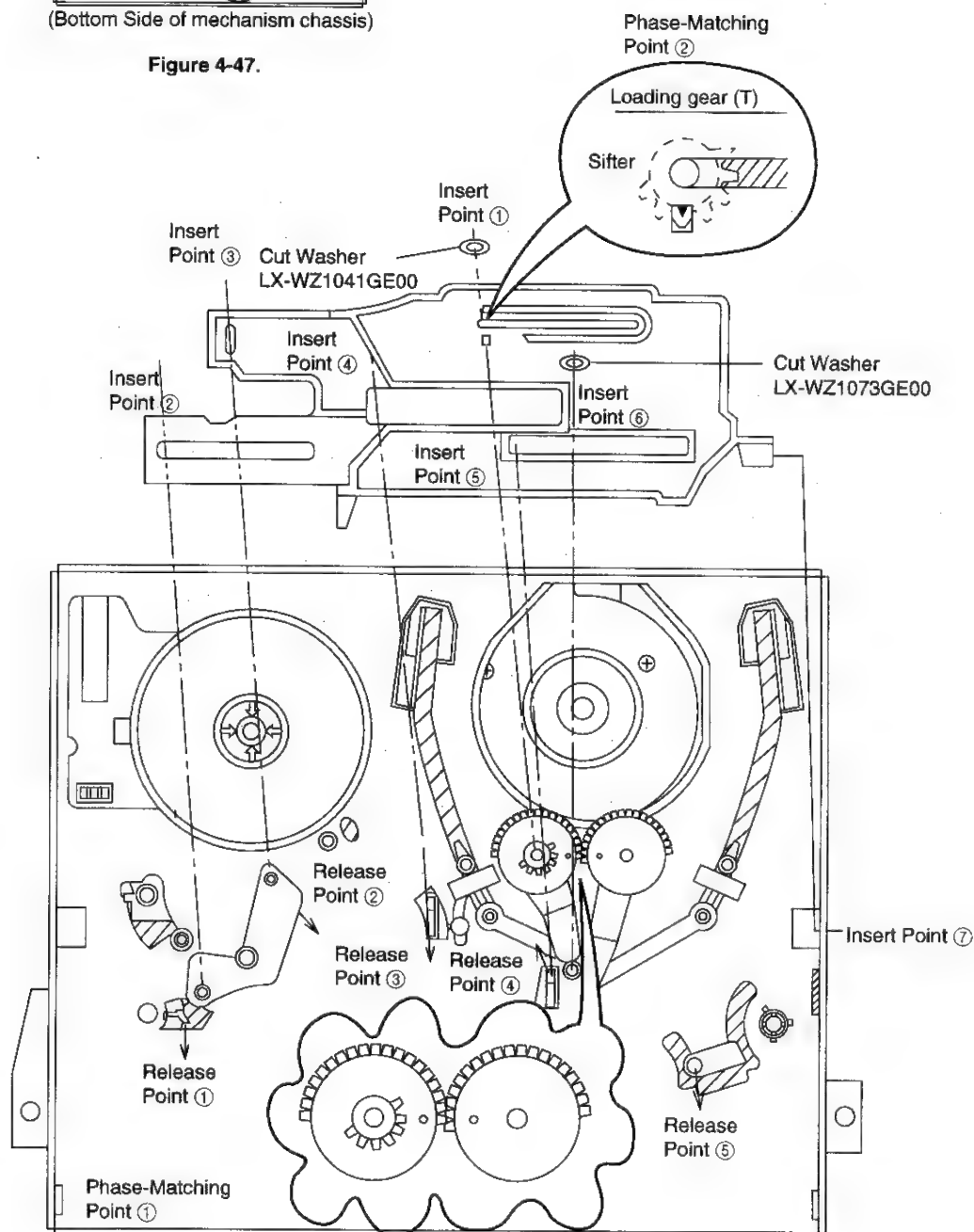


Figure 4-48.

3. Mounting the master cam (on the back of the mechanism chassis).

- (1) Make sure beforehand that the shifter is at the point as shown below.
- (2) Place the master cam in the position as shown below.

Note:

See the figure below for the phase matching between the master cam and the cassette control drive gear.

- (3) Finally fix the master cam with E ring.

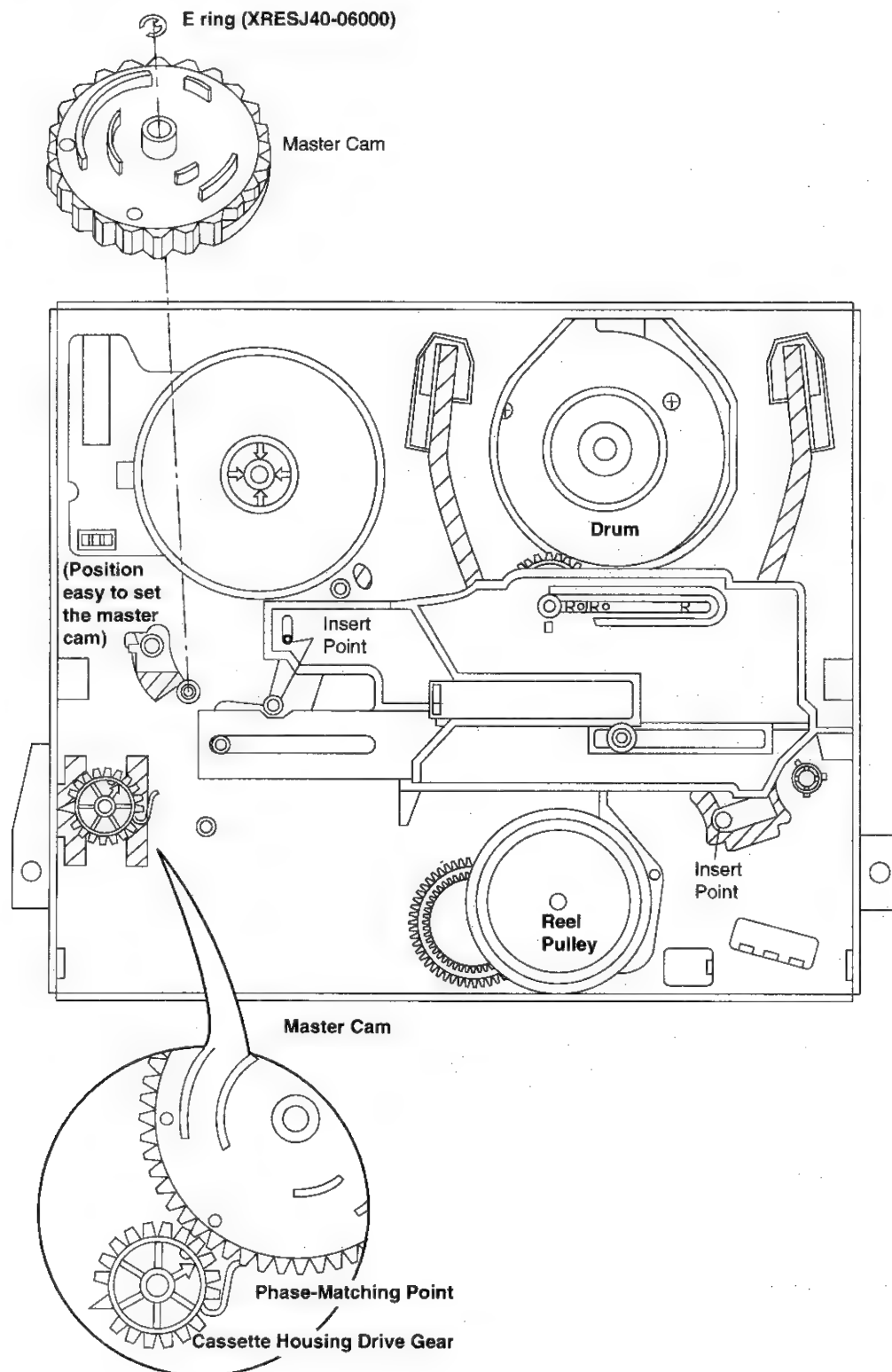


Figure 4-49.

4. Mounting the connection gear, slow brake and loading motor assemblies (on the back of the mechanism chassis).

- (1) Assemble the connect gear.
- (2) Assemble the slow brake.
- (3) Assemble the loading motor unit.

Note:

Let the slow brake leg out of the front of the mechanism chassis. Catch the spring to the take-up fixing guide that is at the left of the A/C head.

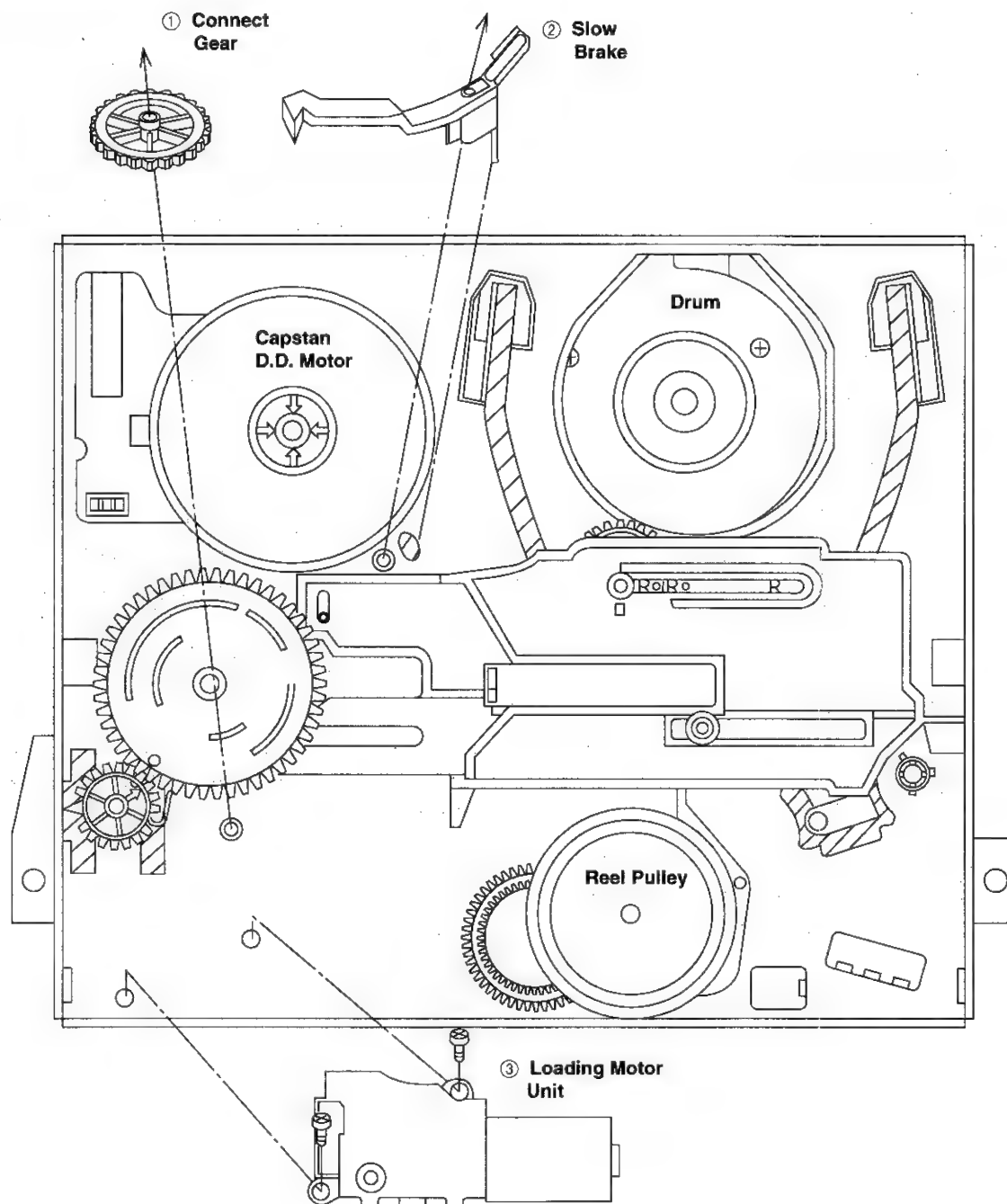


Figure 4-50.

Note:

Before setting up the loading motor, make sure the phase is matched. To do so, turn the connection gear clockwise and check to see if the loading is complete and if the pinch roller comes into contact.

When these actions are made smoothly, return the mechanism to the state as shown above. Finally mount the loading motor unit.

REPLACEMENT OF LOADING MOTOR

• Removal

Remove 2 screws.

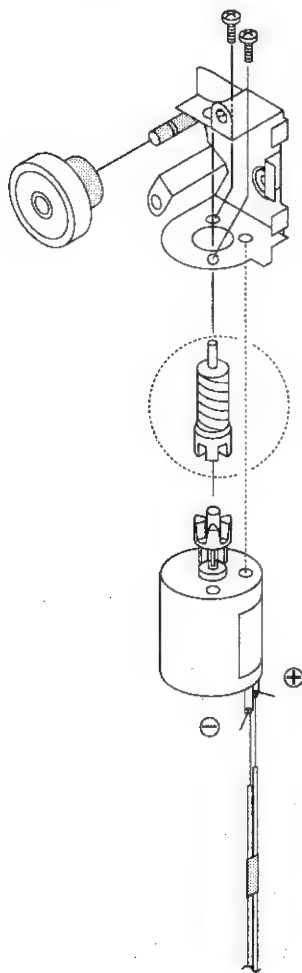


Figure 4-51.

• Replacement

- ① Take out the old loading motor. Place a replacement loading motor as shown above (Figure 4-51.).

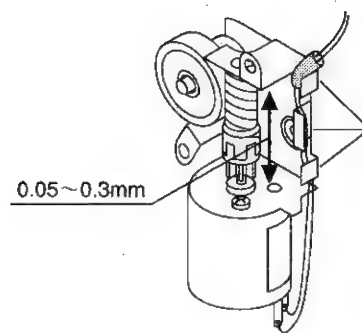


Figure 4-52.

- ② Adjust the worm gear's thrust gap to 0.05 to 0.3 mm. Use the specific washers for an appropriate thickness.

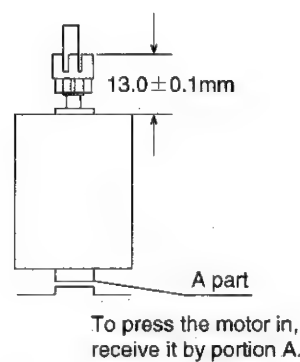
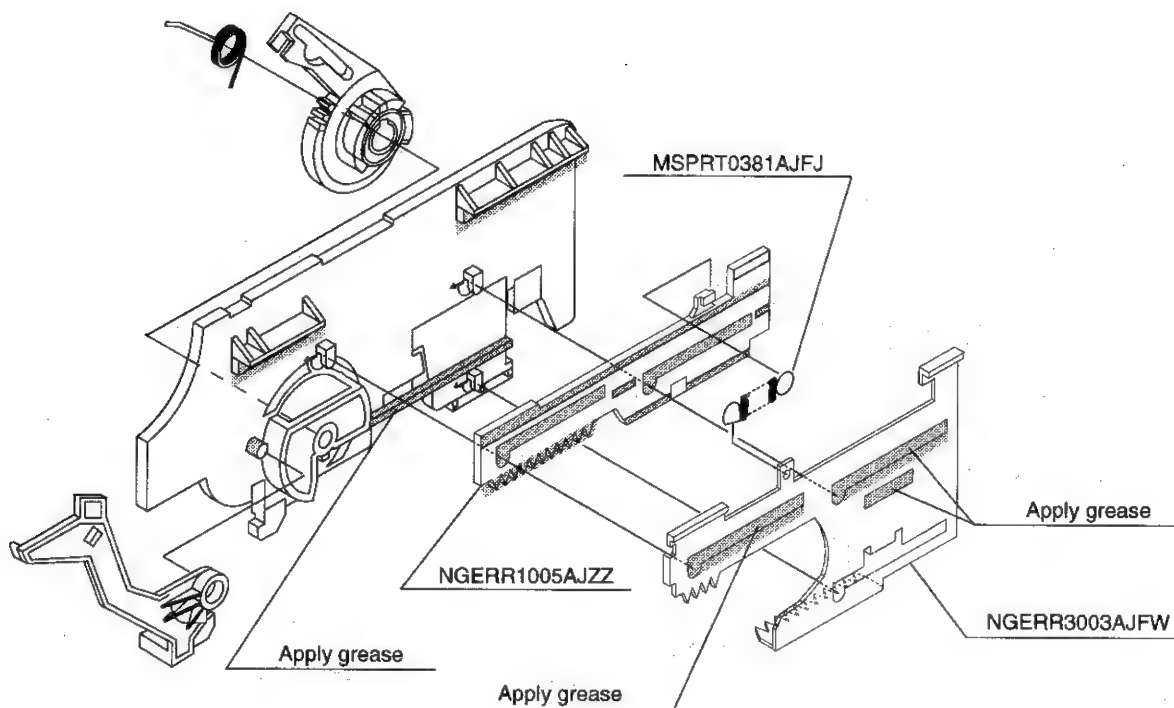


Figure 4-53.

Press-fit the loading motor pulley with a force of less than 98N (10 kgf). Be sure that the pulley is 13.0 ± 0.1 mm away from the motor.

ASSEMBLY OF CASSETTE HOUSING

① Drive Gear R and Drive Angle Ass'y



Phase Matching Point

- Fix the drive angle ass'y to the drive gear Ras shown in the figure.

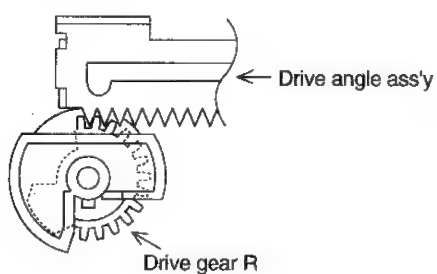


Figure 4-54.

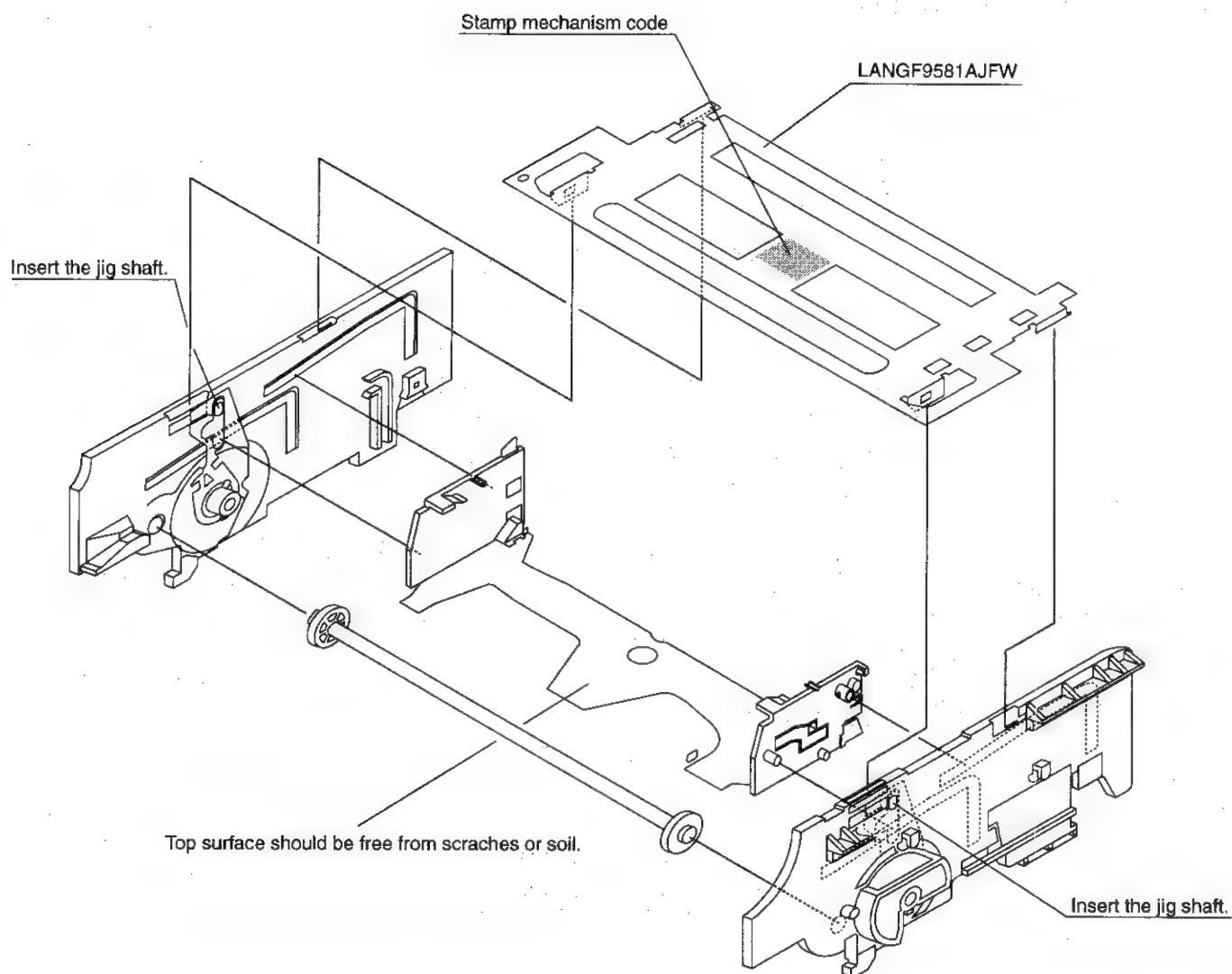


Figure 4-55.

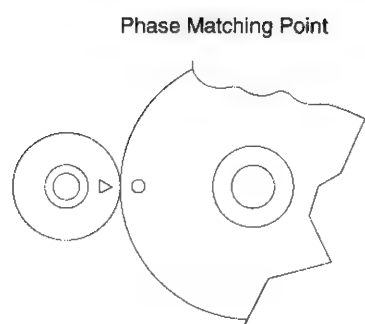


Figure 4-56.

such a case, the phase needs rematching. Align the drive gear's round hole with the synchro gear's triangular (Δ) symbol. Do this alignment for both the drive gears.

② Synchro Gear, Drive Gear L and Drive Gear R

Note:

Do not over-turn both of the drive gears when the phase has been matched. These gears are partially toothless and might come out of mesh with the synchro gear. In

5. ELECTRICAL ADJUSTMENT

Notes:

- Before the adjustment:
Electrical adjustments discussed here are often required after replacement of electronic components and mechanical parts such as video heads.
Check that the mechanism and all electric components are in good working condition prior to the adjustments, otherwise adjustments can not be completed.

• Instruments required:

- | | |
|-------------------------------|-----------------------------|
| ○ Colour TV monitor | ○ Dual-trace oscilloscope |
| ○ Audio signal generator | ○ AC milli-voltmeter |
| ○ DC voltmeter | ○ Frequency counter |
| ○ Blank video cassette tape | ○ Alignment tape (VROCPSV) |
| ○ Screwdriver for adjustment | ○ Alignment tape (VROATSV) |
| ○ Colour bar signal generator | ○ Alignment tape (VROCBFFS) |

✕ Servicing precautions

When the IC804 (E²PROM) has been replaced, make the following reprogramming. Depending on models, the IC804 (E²PROM) has been factory-adjusted for it's memory function.

It's therefore necessary to reprogram the memory function for the model in question.

Note that the servo circuit requires readjustments for the head switching point, slow and still modes.

• Location of controls and test points

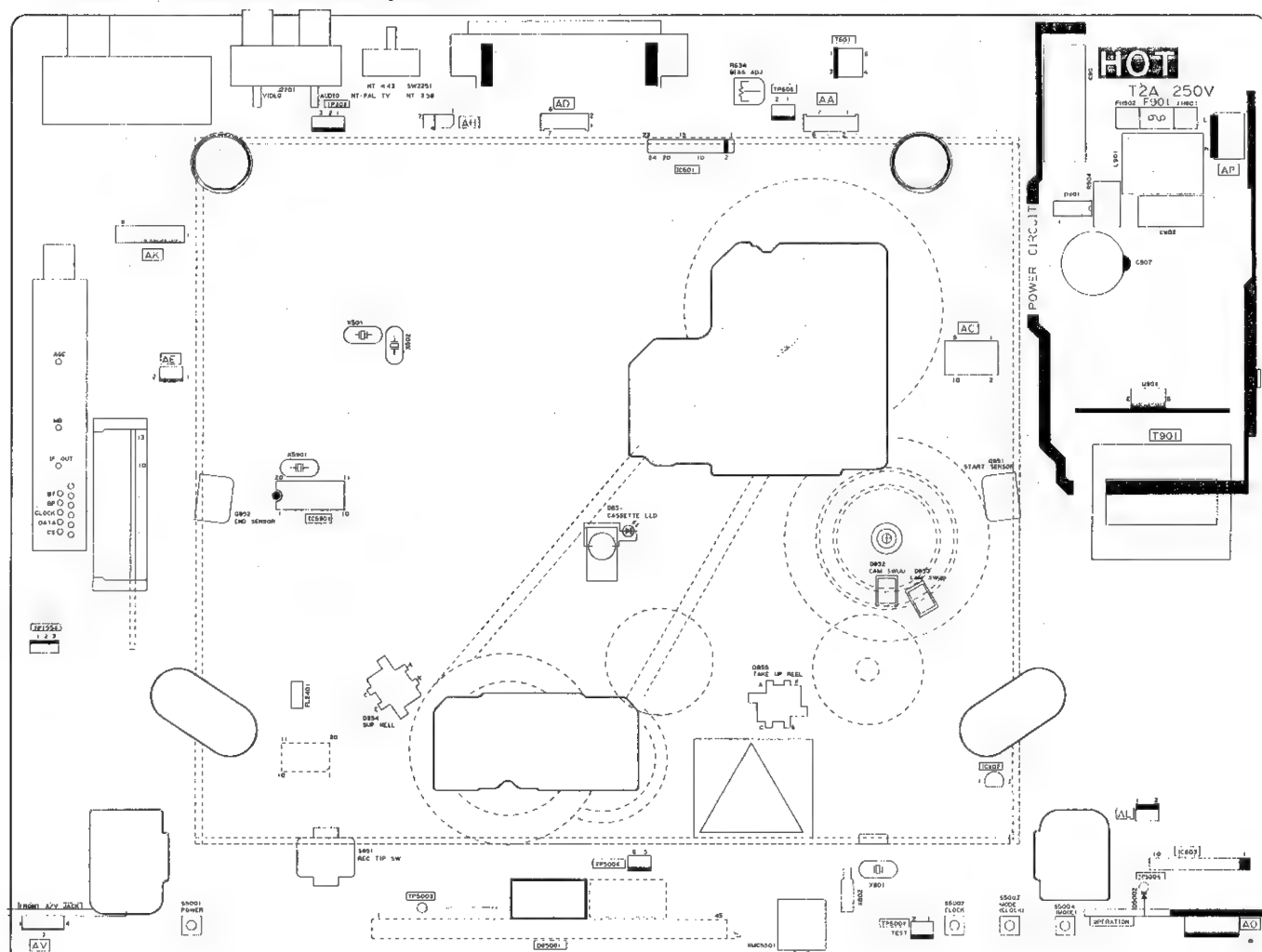


Figure 5-1.

SERVO CIRCUIT ADJUSTMENT

ADJUSTMENT OF HEAD SWITCHING POINT

| | |
|----------------------|--|
| Measuring instrument | Dual-trace oscilloscope Colour TV monitor |
| Mode | Playback |
| Cassette | Alignment tape (VROCPSV) |
| Test point | ② pin of TP301 (H.S.W.P.) to CH-1, VIDEO OUT jack to CH-2 (CH-1 trigger slope switch at (+), Internal trigger at CH-1 side.) |
| Specification | $6.5 \pm 0.5H$ (lines) |

1. Remove the front panel and play the alignment tape. (VROCPSV)
(Playback picture on the monitor screen.)
2. Make for a moment short-circuit between TP5001 and TP5002, both located at the front side on the main PWB.
Be sure that all the fluorescent display tubes light up into the TEST mode.
(See Note below)
3. Press the PLAY button.
Be sure the "PLAY" appears in the fluorescent display tubes flashing (about 1Hz) into the auto PG adjustment operating.

Note:

When the manual PG adjustment, observe the waveform with an oscilloscope and make adjustment FF or REW button so that the specification.

4. Stop the "PLAY" appears in the flashing of fluorescent display tubes at adjusted.
5. Press the STOP button in the return to normal mode.
6. Make this checking of waveform on the oscilloscope screen be as shown in Figure 5-2. just after the head switching point have been adjusted.

Note:

- ① Set-up of TEST mode.
When the adjustment of HEAD SWITCHING POINT, AUTO TRACKING function is invalid.
- ② When the cassette housing control ass'y is removed, set-up of mechanism operating mode.
 - 1) Replug the AC power cord it a few minutes later.
 - 2) Make a short-circuit between TP5005 and TP5006, both located at the front side on the main PWB with a 22 ohm resistor, to center the tracking.
 - 3) AC power cord is plugged in.
 - 4) You can mechanism operating mode, Replug the AC power cord a few minutes later.

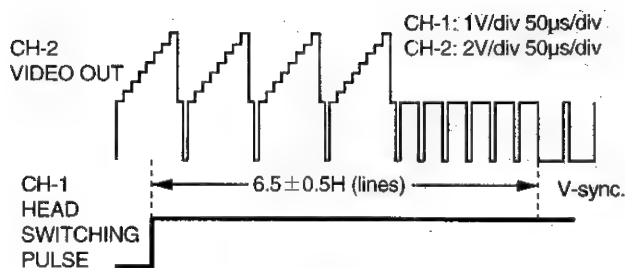


Figure 5-2.

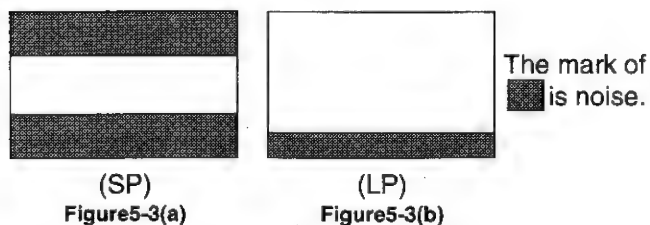
ADJUSTMENT OF SLOW TRACKING PRE-SET

| | |
|----------------------|--|
| Measuring instrument | Colour TV monitor |
| Mode | Playback |
| Cassette | Self-recorded tape (See Note below) |
| Control | Tracking control buttons (+) or (-) |
| Specification | Reference of following step 6. |

1. Have the unit to receive a good TV broadcast or feed a video signal to the VIDEO IN jack. (See note ② below)
2. Set the tape speed in SP mode by using the remote control and record the signal on tape.
3. Rewind and play the tape where signal was recorded in above step.
4. Press the SLOW button on the remote control, and playback the recorded portion in the slow mode.
5. Make for a moment short-circuit between TP5001 and TP5002, both located at the front side on the main PWB.
Be sure that all the fluorescent display tubes light up into the TEST mode.
6. Look at the monitor screen and adjust the (+) or (-) TRACKING buttons so that the position of noise come following Figure 5-3(a) and (b).
7. Press the STOP button to return to normal mode.
8. Play the tape a few seconds then press the SLOW button again and make sure there is no noise in the screen.
(For the LP mode put adjustment at the same adjustment way as SP mode.)

Notes:

- ① Self-recorded tape means a cassette whose program was recorded by the unit being adjusted.
- ② The TV program will not be recorded if RCA or 21pin plugs are plugged in to the AUDIO/VIDEO input terminals.



ADJUSTMENT OF FV (False Vertical Sync) OF STILL PICTURE

| | |
|----------------------|--|
| Measuring instrument | Colour TV monitor |
| Mode | Playback still |
| Cassette | Self-recorded tape (See Note below ②) |
| Control | Tracking control buttons (+) or (-) |
| Specification | No vertical jitter of picture |

1. Play a cassette which was recorded.
2. Press the PAUSE/STILL button to freeze the picture.
3. Look at the monitor screen and adjust (+) or (-) TRACKING buttons so that the vertical jitter of the picture to be minimized.
4. Play and freeze the self-recorded tape and make sure vertical jitter of the picture is not noticeable.
(For the LP mode put adjustment at the same adjustment way as SP mode.)

Note:

- ① The FV goes back to the it's initial state when the unit is put into the system controller reset mode due to power failure, etc.
In this case, preset the FV once again.
- ② Self-recorded tape is a cassette whose program was recorded by the unit being adjusted.

Y/C CIRCUIT ADJUSTMENT

CHECKING OF VIDEO E-E LEVEL

| | |
|----------------------|--------------------------|
| Measuring instrument | Oscilloscope |
| Mode | E-E or Record |
| Input signal | EIA colour bar (1.0Vp-p) |
| Test point | VIDEO OUT jack |
| Specification | 1.0 ± 0.1Vp-p |

- 1. Connect a 75 ohm terminating resistor to the VIDEO OUT jack and connect an oscilloscope across this terminating resistor.
(See Note below.)
- 2. Feed a colour bar signal to the VIDEO IN jack.
- 3. Make sure that the E-E signal amplitude is 1.0Vp-p as shown in Figure 5-3.

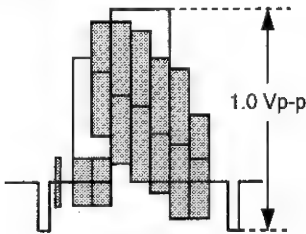


Figure 5-3.

Notes:

If the 75 ohm terminating resistor is missing, the signal amplitude will be doubled.

CHECKING OF WHITE CLIP LEVEL

| | |
|----------------------|---------------------------|
| Measuring instrument | Oscilloscope |
| Mode | E-E or Record |
| Input signal | EIA colour bar (1.0Vp-p) |
| Test point | Pin(48) of IC401, GND |
| Specification | 190 ± 5% (See note below) |

- 1. Connect a oscilloscope to pin(48) of IC401 and GND.
- 2. Feed the colour bar signal to the VIDEO IN jack and set the unit in E-E or recording mode.
- 3. Make sure that the overshoot of the video signal is clipped at 190% as shown in Figure 5-4.

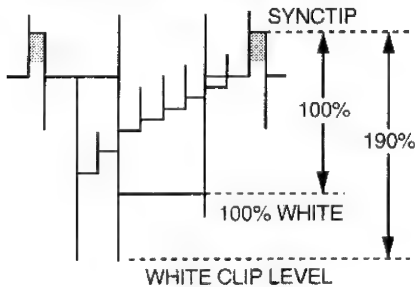


Figure 5-4.

Note:

From sync tip to white peak, the level is 100%.
The white clip level is 90% above the white level.

CHECKING OF RECORD LEVEL

| | |
|----------------------|--|
| Measuring instrument | Dual-trace oscilloscope |
| Mode | Record mode |
| Input signal | EIA colour bar (1.0Vp-p) |
| Test point | Chroma (Red) R515 terminal lead at L509 side (Sig.) ~ GND Sync tip R226 terminal lead at L210 side (Sig.) ~ GND |
| Specification | Chroma (Red): 205~290mVp-p Sync tip: 360~440mVp-p |

- 1. Feed the colour bar signal to the VIDEO IN jack and set the unit in recording mode.
- 2. Connect a dual -trace oscilloscope to each test point shown in table.
- 3. Make sure so that the amplitude of the chrome (Red) portion and the sync tip portion are specified as shown in Figure 5-5

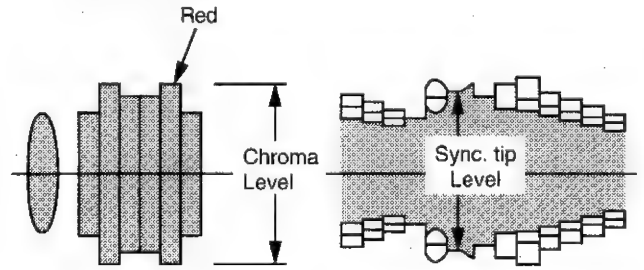


Figure 5-5 (a).

Figure 5-5 (b).

CHECKING OF PLAYBACK LEVEL

| | |
|----------------------|---------------------------|
| Measuring instrument | Oscilloscope |
| Mode | Record/Playback |
| Input signal | EIA colour bar (1.0Vp-p) |
| Test point | VIDEO OUT jack |
| Specification | $1.0 \pm 0.1 \text{Vp-p}$ |

1. Be sure that E-E level has been correctly specified.
2. Connect a 75 ohm terminating resistor to the VIDEO OUT jack and connect an oscilloscope across this terminating resistor.
(See Note below.)
3. Feed a colour bar signal to the VIDEO IN jack and set the unit in recording mode.
4. Play the colour bar portion of the recorded tape.
5. Make sure that the output signal amplitude is 1.0Vp-p as shown in Figure 5-6.

Note:

If the 75 ohm terminating resistor is missing, the signal amplitude will be doubled.

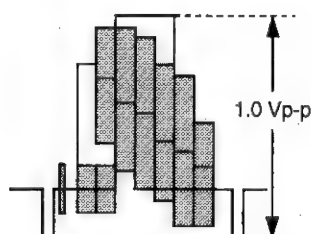


Figure 5-6.

AUDIO CIRCUIT

CHECKING OF E-E LEVEL

| | |
|----------------------|--|
| Measuring instrument | AC milli-voltmeter |
| Mode | E-E/Record |
| Input signal | 1kHz, -8.0dBs (at RCA type jack) 1kHz, -3.8dBs (at 21pin type jack) |
| Test point | AUDIO OUT jack |
| Specification | -8.0±2dBs (at RCA type jack) -3.8±2dBs (at 21pin type jack) |

1. Connect an oscilloscope to the AUDIO OUT jack.
2. Feed the audio signal shown in table to the AUDIO IN jack.
3. Put the unit in E-E or recording mode.
4. Make sure that the output level is value shown in table.

CHECKING OF AUDIO PLAYBACK LEVEL

| | |
|----------------------|---|
| Measuring instrument | AC milli-voltmeter |
| Mode | Playback |
| Input signal | Alignment tape.(VROCPSV) (1kHz level control signal.) |
| Test point | AUDIO OUT jack |
| Specification | -9 ^{+2dB} _{-1dB} |

1. Playback the Alignment tape. (VROCPSV 1kHz level audio signal)
2. Connect an AC milli-voltmeter to the AUDIO OUT jack.
3. Make sure that the output level is value shown in table.

CHECKING OF AUDIO RECORD LEVEL

| | |
|----------------------|--|
| Measuring instrument | AC milli-voltmeter |
| Mode | Record/playback |
| Input signal | 1kHz, -8.0dBs (at RCA type jack) 1kHz, -3.8dBs (at 21pin type jack) |
| Test point | AUDIO OUT jack |
| Specification | -8.0±3dBs (at RCA type jack) -3.8±3dBs (at 21pin type jack) |

1. Connect an oscilloscope to the AUDIO OUT jack.
2. Feed the audio signal shown in table to the AUDIO IN jack.
3. Make the self-recording and playback of the signal.
4. Make sure that the output level is value shown in table. If it's out of specified value, verify the bias current (CHECKING OF AUDIO BIAS CURRENT below).

CHECKING OF AUDIO BIAS CURRENT

| | |
|----------------------|-----------------------|
| Measuring instrument | AC milli-voltmeter |
| Mode | Record |
| Input signal | Not required |
| Test point | TP601 (+) ~ TP602 (-) |
| Specification | 2.5±0.1mVrms |

1. Connect an AC milli-voltmeter to TP601 (+) and TP602 (-).
(Use TP602 for ground lead.)
2. Put the unit in recording mode.
3. Make sure that the AC milli-voltmeter reads 2.5±0.1mVrms.

CHECKING OF ERASE VOLTAGE AND OSCILLATION FREQUENCY

| | |
|----------------------|----------------------------|
| Measuring instrument | Oscilloscope |
| Mode | Record |
| Test point | Full erase head |
| Control | T601 |
| Specification | 70±5kHz, 40Vp-p or greater |

1. Put the unit in recording mode.
2. Connect an oscilloscope across the full erase head.
3. Make sure the erase voltage across the full erase head is approx. 40Vp-p or more and frequency is 70±5kHz.

RF CIRCUIT

ADJUSTMENT OF RF AGC CIRCUIT

| | |
|----------------------|--|
| Measuring instrument | DC voltmeter and VHF signal generator |
| Mode | RF signal at E69-CH (by VHF signal generator) (EBU colour bar signal at 87.5% modulated.) |
| Test point | TP1551 (Sig.) TP1553 (GND) |
| Control | VR001 AGC control |
| Specification | $5.6 \pm 0.1V$ |

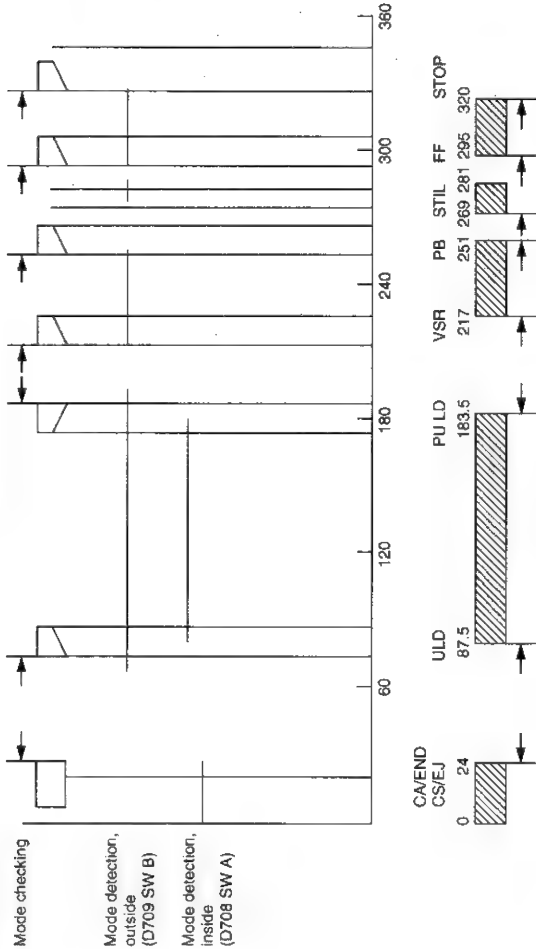
1. Receive the E69 channel signal(colour bar signal at 87.5% modulated.) at Input field strength: 53dB μ V of antenna terminal.
2. Connect a DC voltmeter to test points shown in table.
3. Adjust VR001 (AGC control) in the IF pack so that the voltage be specified.

6. MECHANISM OPERATION FLOWCHART AND TROUBLESHOOTING GUIDE

MECHANISM OPERATION FLOWCHART

* This flowchart describes the outline of the mechanism's operation, but does not give its details.

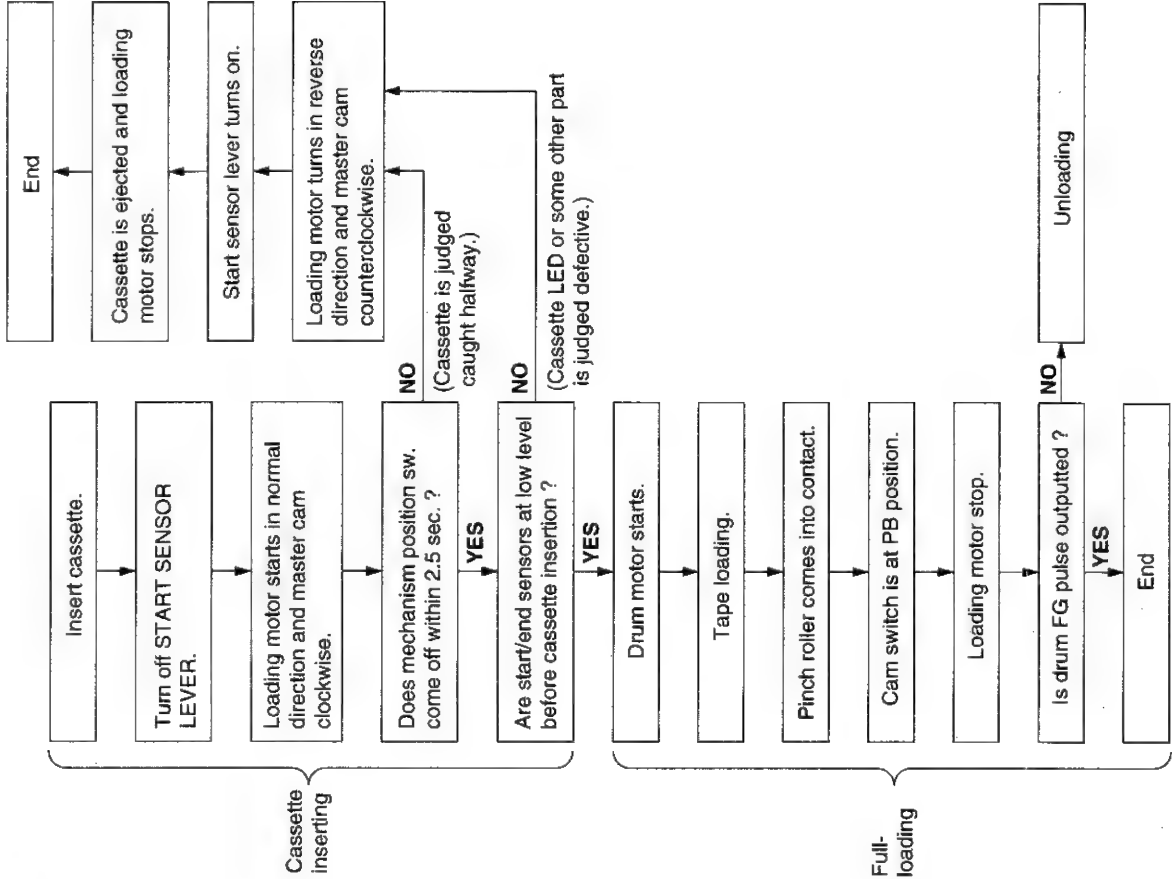
Cam movement chart



| | CS/EJ | | | | ULD | | PULD | | VSR | PB | STL | FF | STOP |
|-------------------------|-------|---|---|---|-----|---|------|---|-----|----|-----|----|------|
| Mode detection, outside | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| Mode detection, inside | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| S sensor | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

start sensor
open
close

CASSETTE INSERTION → STOP

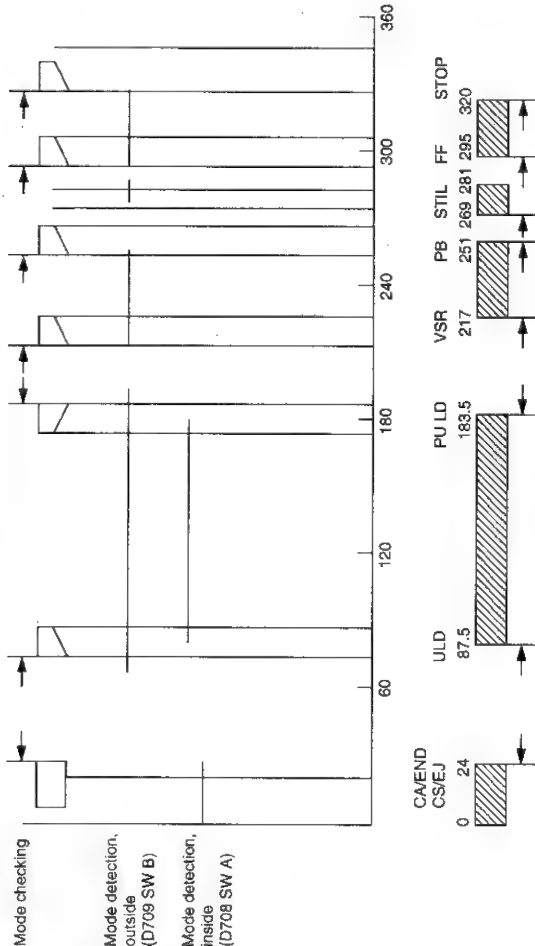


6. MECHANISM OPERATION FLOWCHART AND TROUBLESHOOTING GUIDE

MECHANISM OPERATION FLOWCHART

* This flowchart describes the outline of the mechanism's operation, but does not give its details.

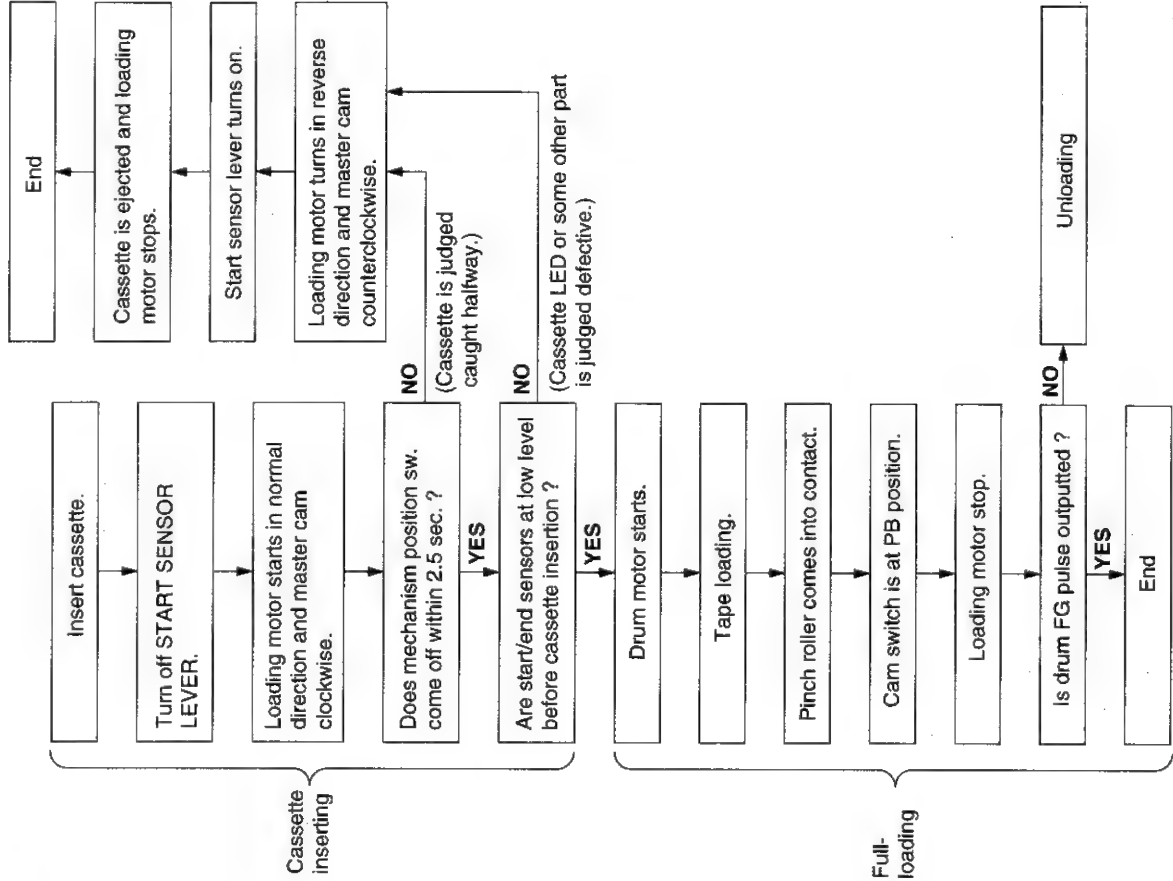
Cam movement chart



| | C/E/EJ | | | UL/D | | PUL/D | | VSR | | PB | | STIL | | FF | | STOP | |
|-------------------------|--------|---|---|------|---|-------|---|-----|---|----|---|------|---|----|---|------|---|
| Mode detection, outside | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Mode detection, inside | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| S sensor | 1 | 1 | 0 | 1 | 1 | 0 | 0 | | | | | | | | | | |



CASSETTE INSERTION → STOP

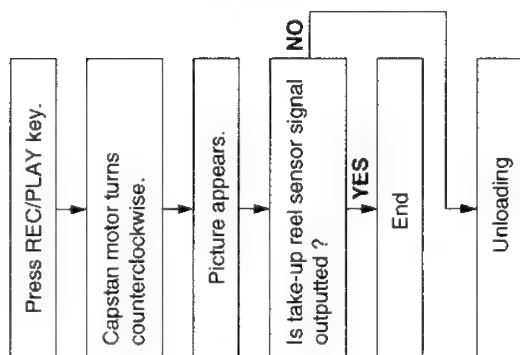
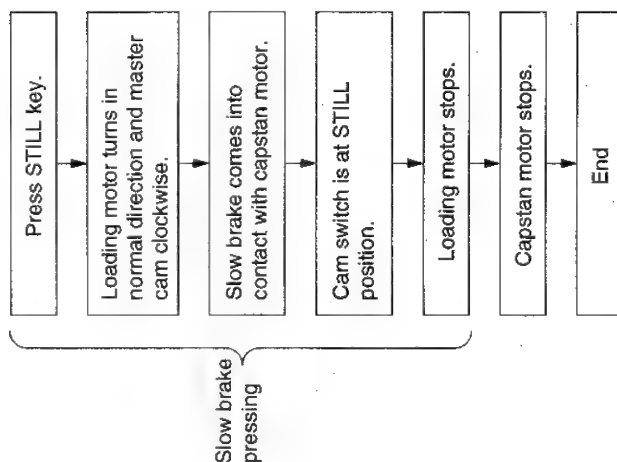
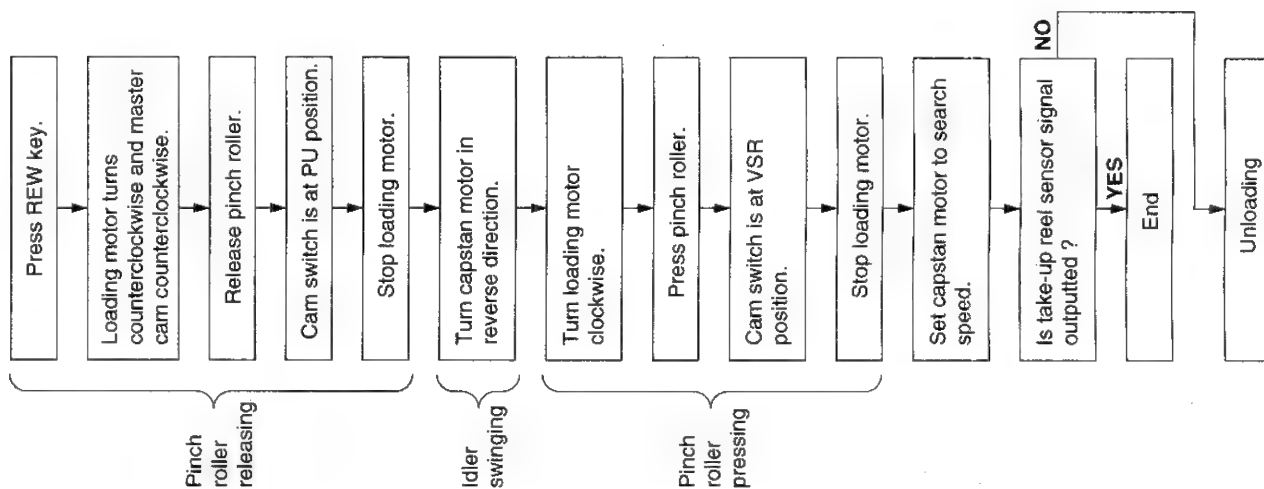
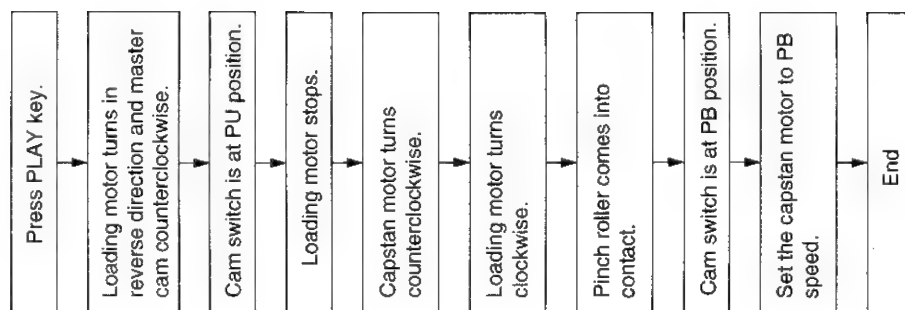
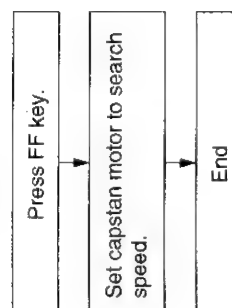
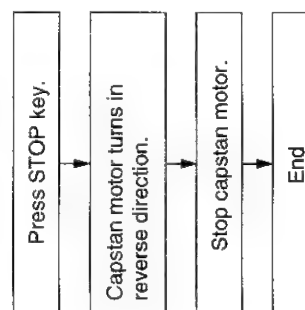


RF CIRCUIT

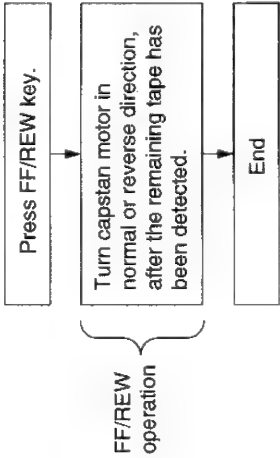
ADJUSTMENT OF RF AGC CIRCUIT

| | |
|----------------------|--|
| Measuring instrument | DC voltmeter and VHF signal generator |
| Mode | RF signal at E69-CH (by VHF signal generator) (EBU colour bar signal at 87.5% modulated.) |
| Test point | TP1551 (Sig.) TP1553 (GND) |
| Control | VR001 AGC control |
| Specification | $5.6 \pm 0.1V$ |

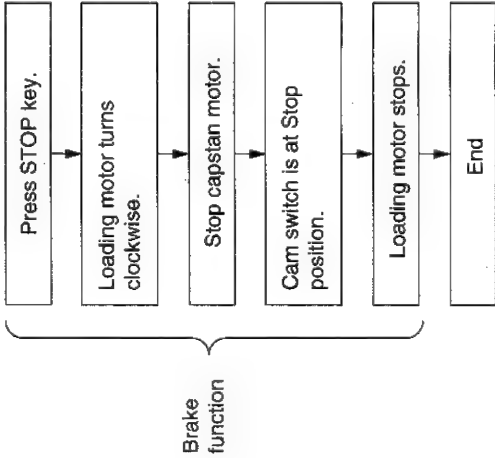
1. Receive the E69 channel signal(colour bar signal at 87.5% modulated.) at Input field strength: 53dB μ V of antenna terminal.
2. Connect a DC voltmeter to test points shown in table.
3. Adjust VR001 (AGC control) in the IF pack so that the voltage be specified.

STOP → REC/PLAYPLAY → STILLPLAY → VSRVSR → PLAYPLAY → VSFREC/PLAY → STOP

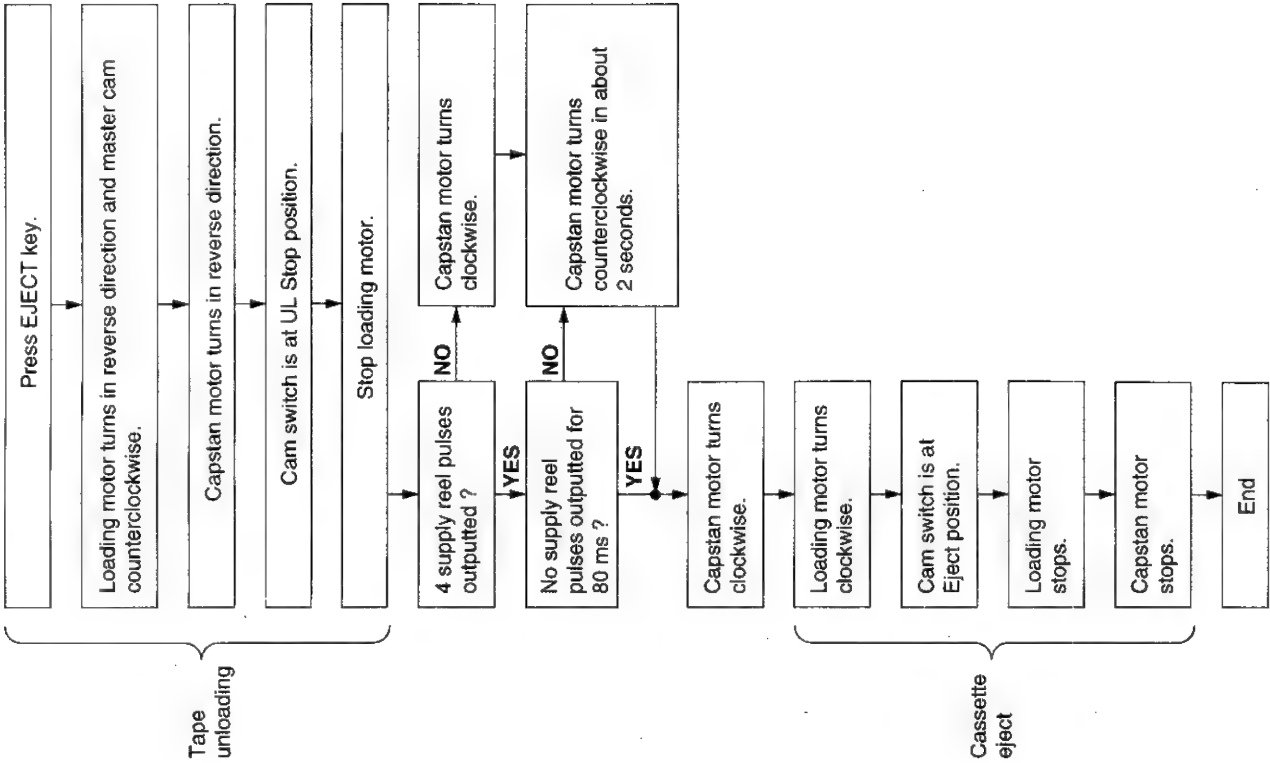
STOP → FF/REW



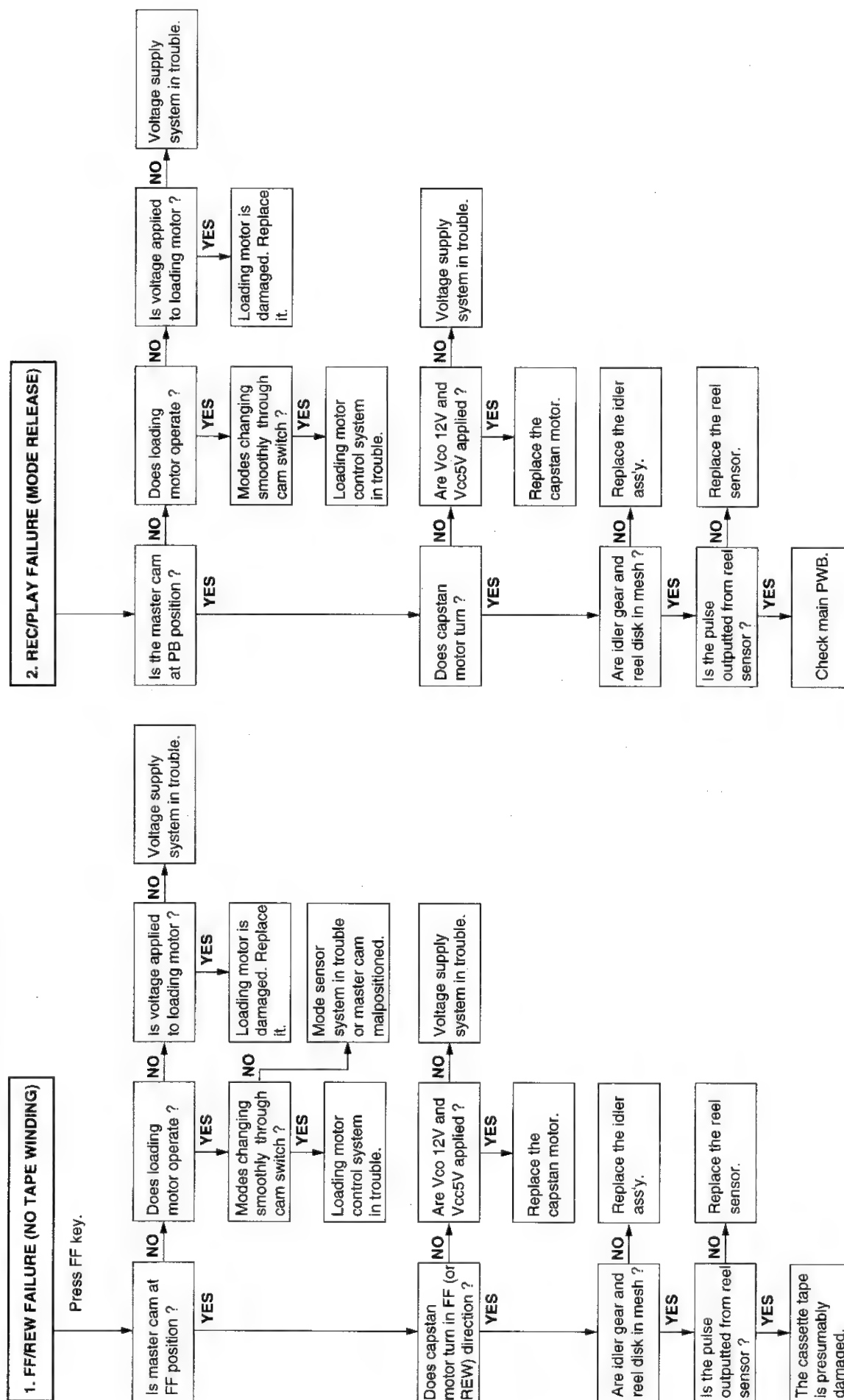
FF/REW → STOP

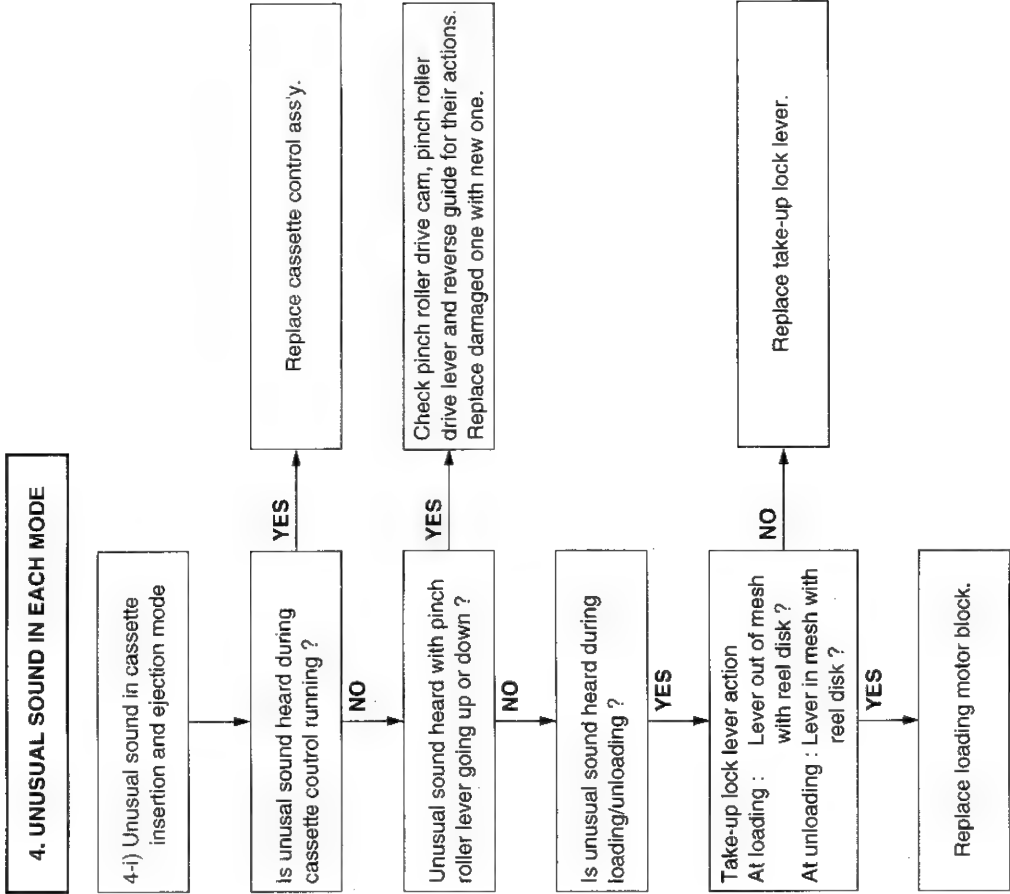
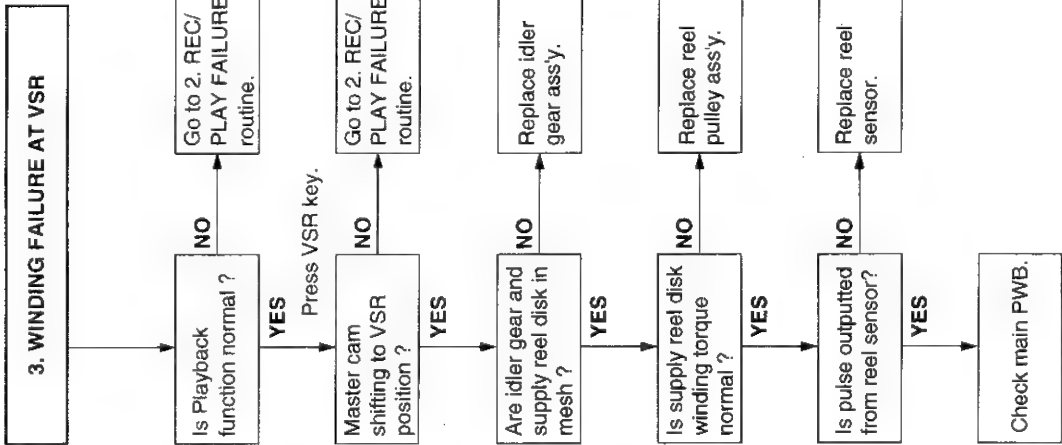


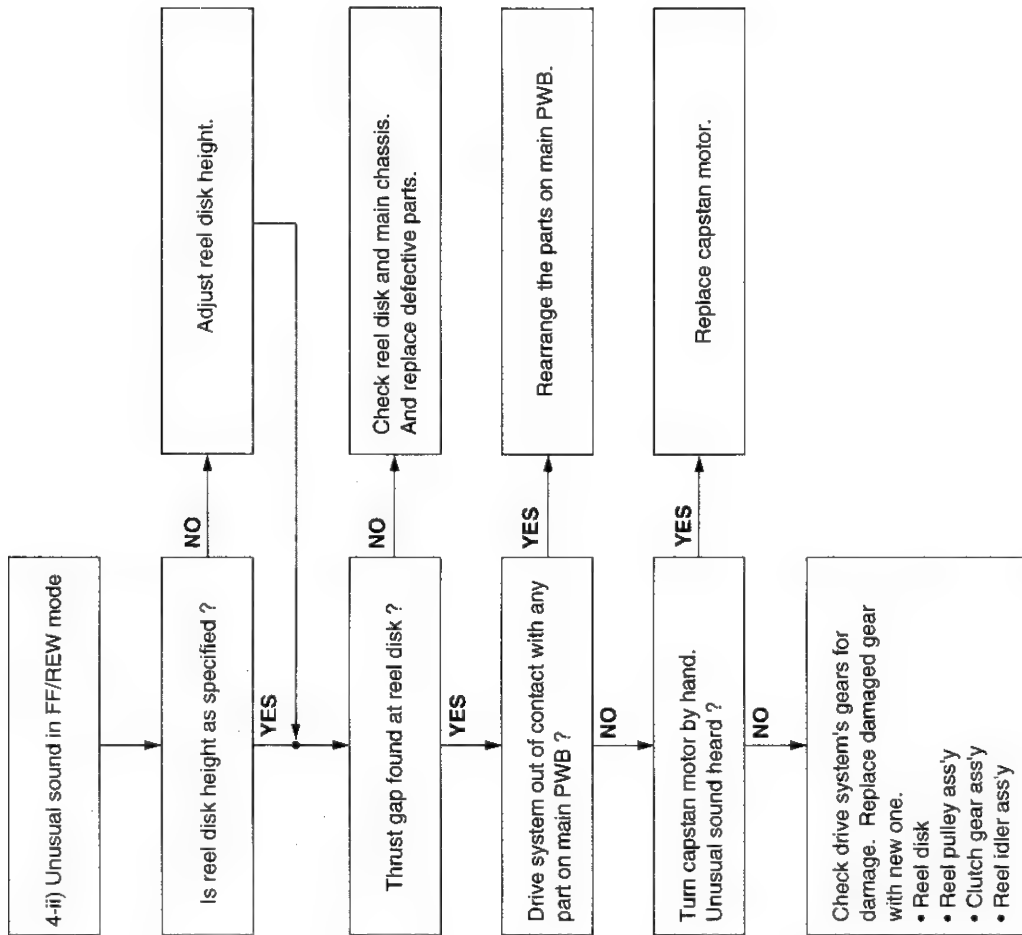
STOP → CASSETTE EJECT



MECHANISM TROUBLESHOOTING

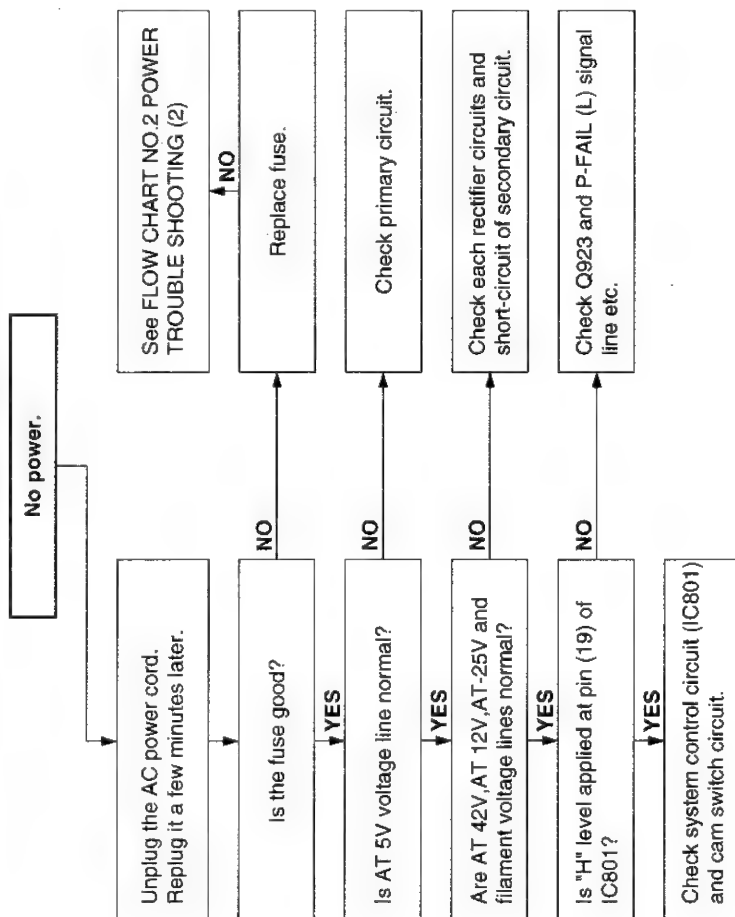




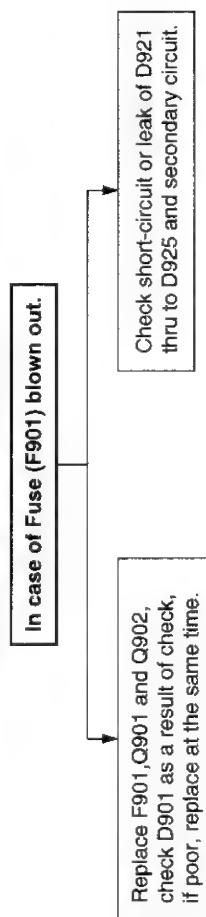


7. TROUBLESHOOTING

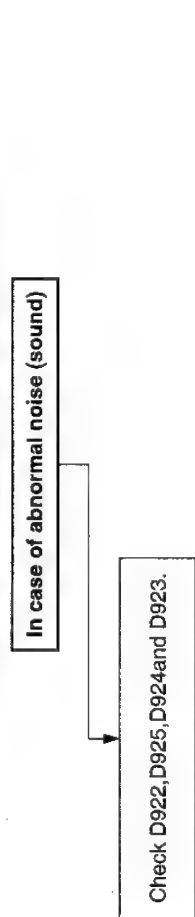
FLOW CHART NO.1 POWER TROUBLESHOOTING (1)



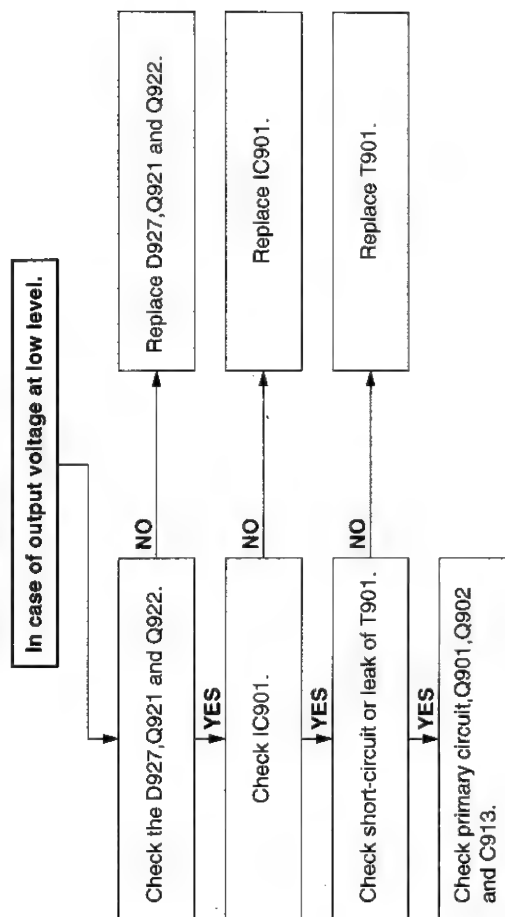
FLOW CHART NO.2 POWER TROUBLESHOOTING (2)



FLOW CHART NO.3 POWER TROUBLESHOOTING (3)

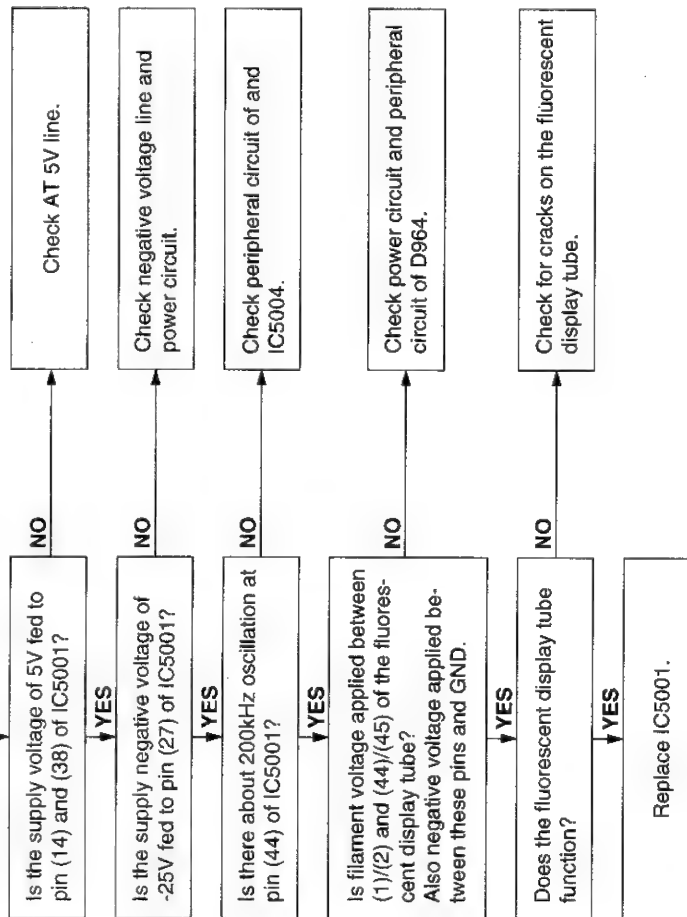


FLOW CHART NO.4 POWER TROUBLESHOOTING (4)



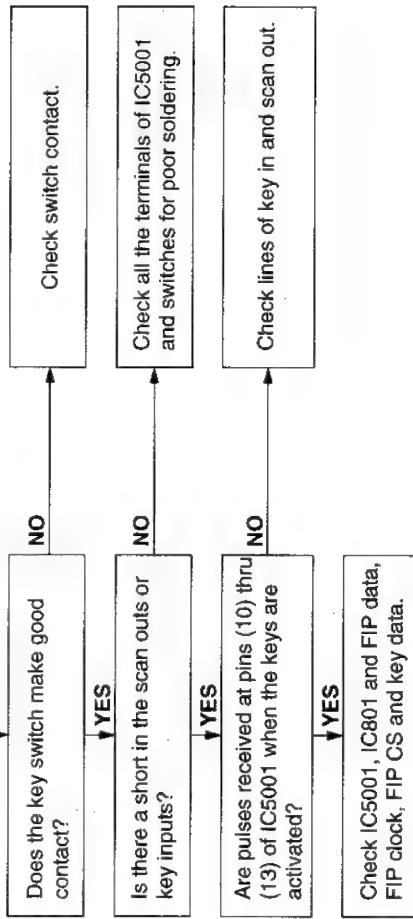
FLOW CHART NO.5 TIMER (1) TROUBLESHOOTING

The fluorescent display tube fails light up.



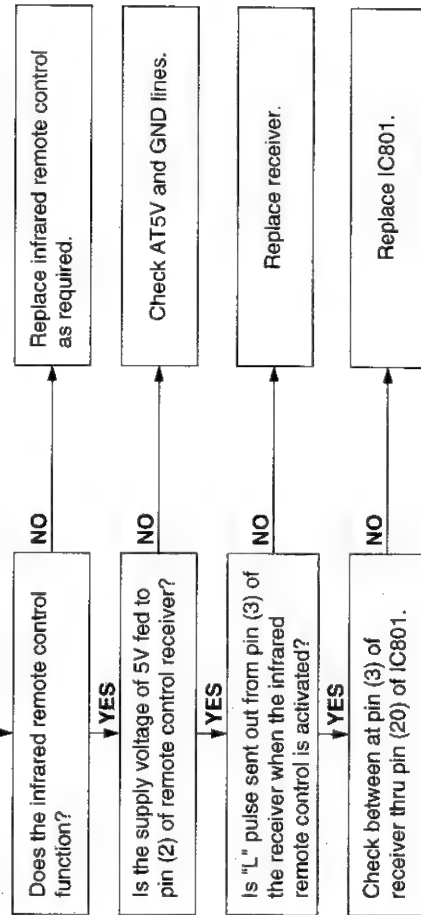
FLOW CHART NO.6 TIMER (2) TROUBLESHOOTING

Key-in input is not received.

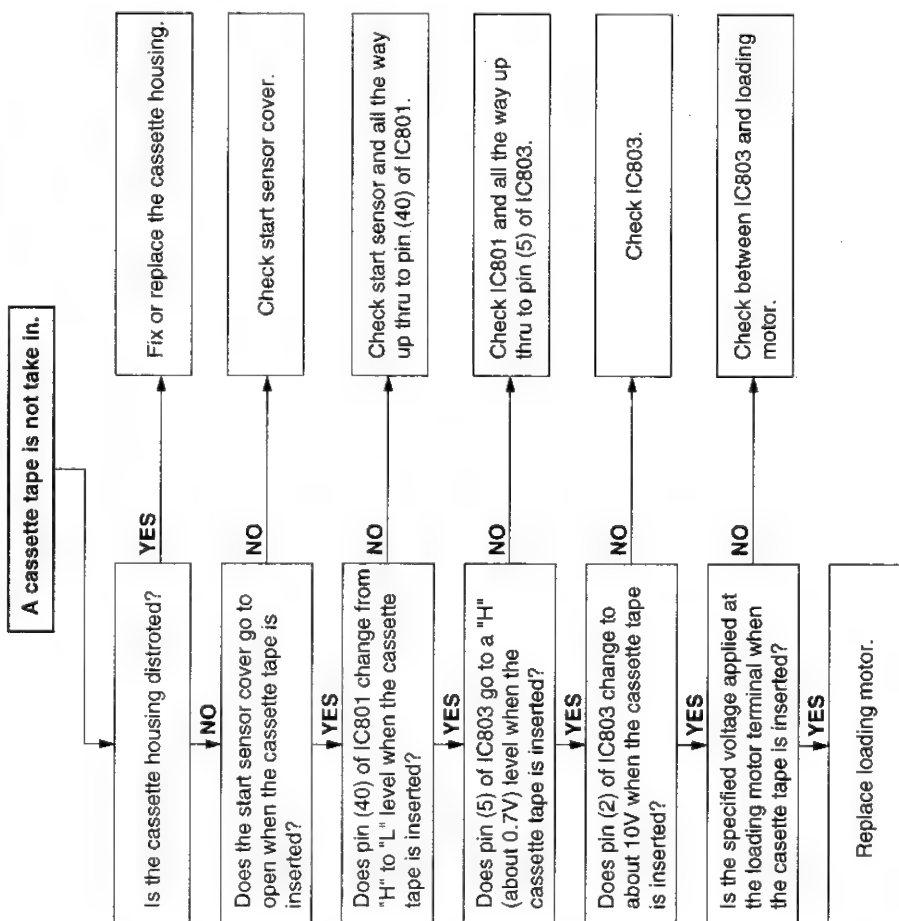


FLOW CHART NO.7 INFRARED R/C TROUBLESHOOTING

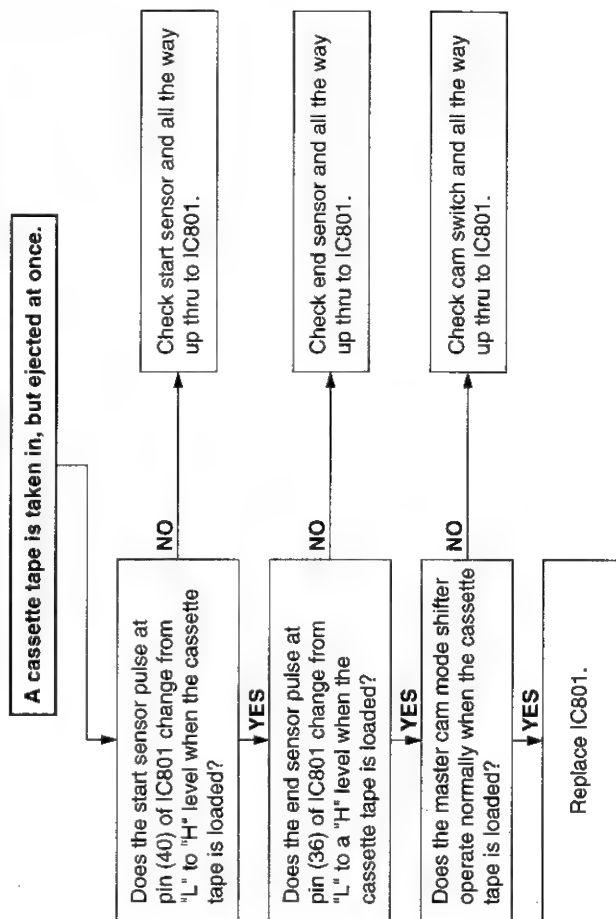
No operation is possible from the infrared remote control.



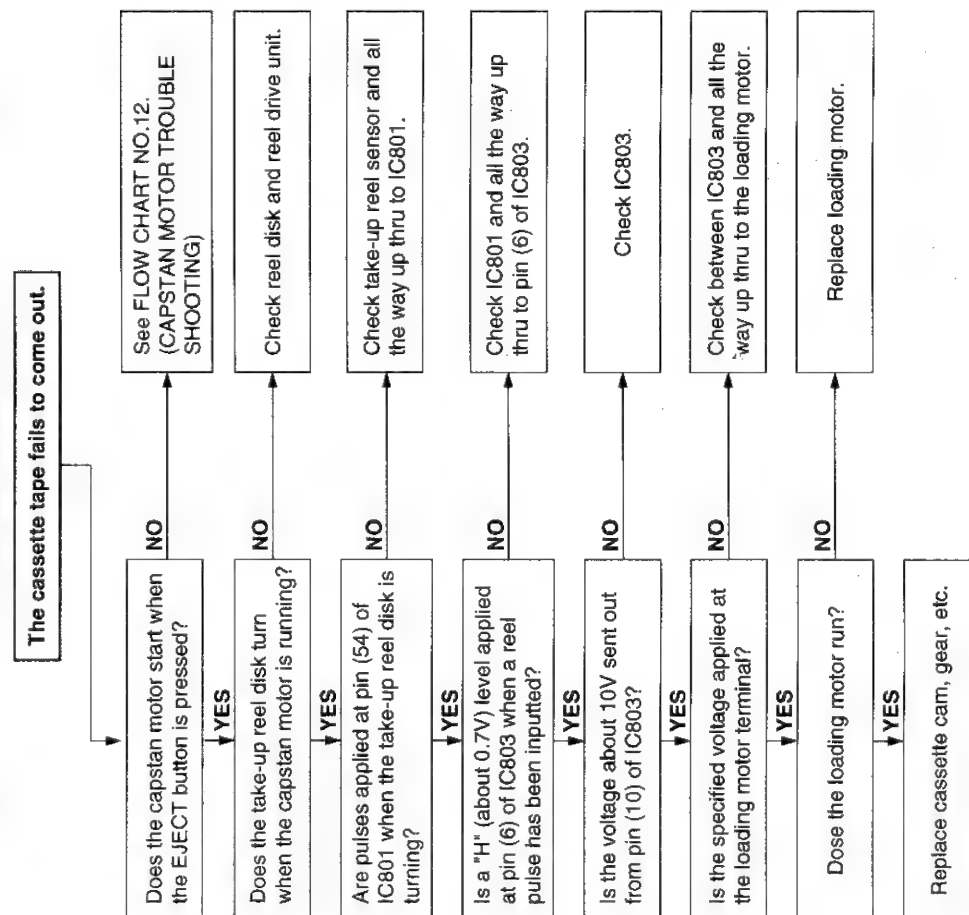
FLOW CHART NO.8 CASSETTE CONTROL TROUBLESHOOTING(1)



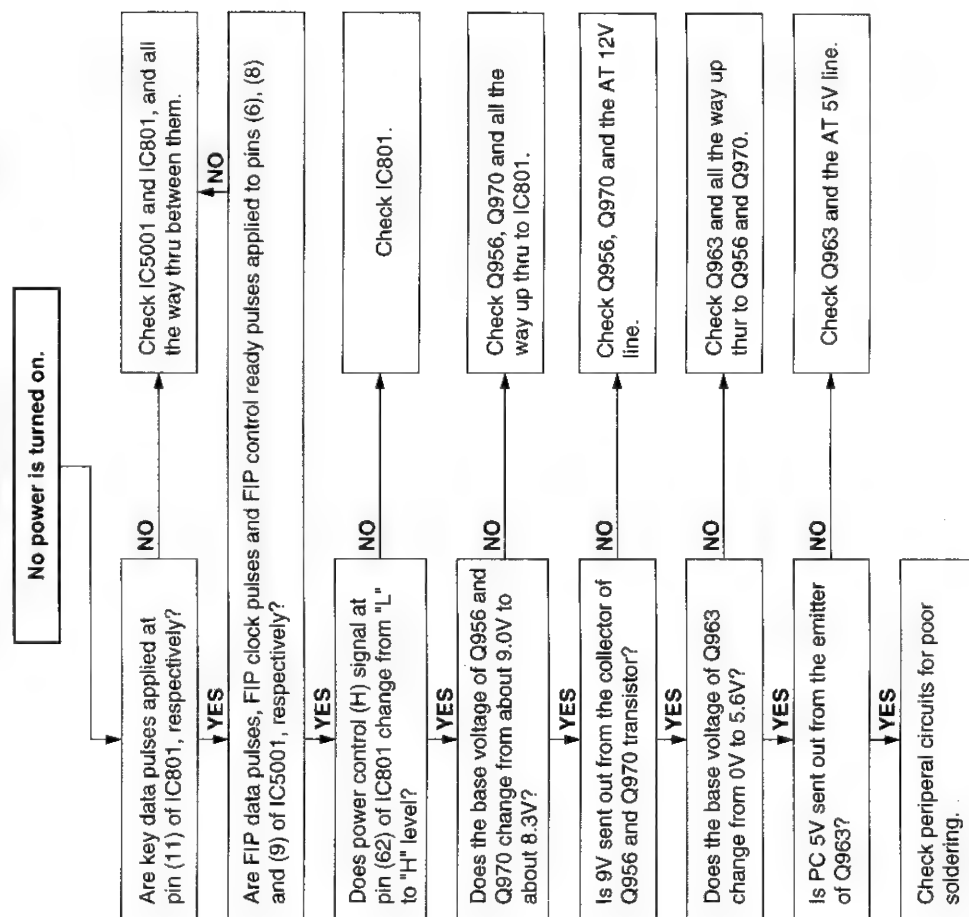
FLOW CHART NO.9 CASSETTE CONTROL TROUBLESHOOTING (2)



FLOW CHART NO.10 LOADING MOTOR AND EJECT TROUBLESHOOTING

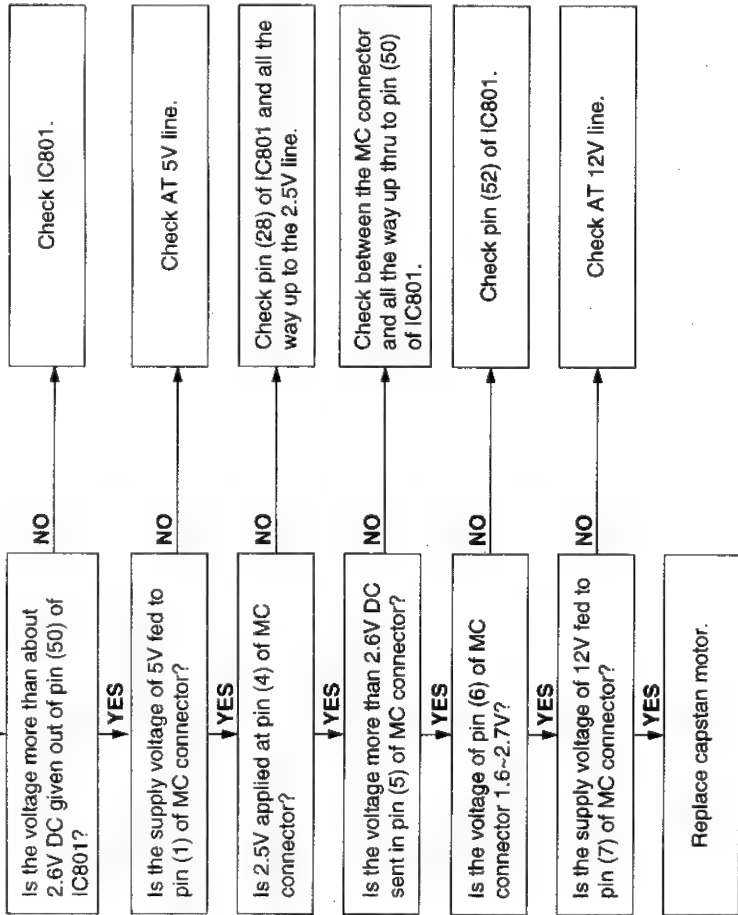


FLOW CHART NO.11 SYSTEM CONTROL TROUBLESHOOTING



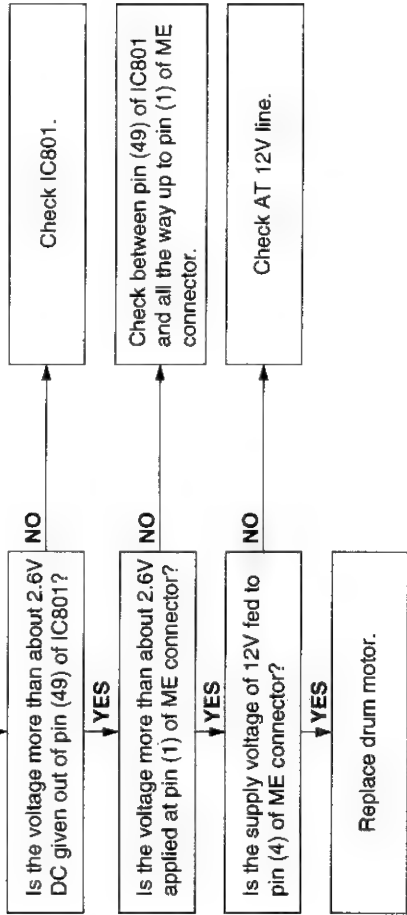
FLOW CHART NO.12 CAPSTAN MOTOR TROUBLESHOOTING

The capstan motor fails to run.

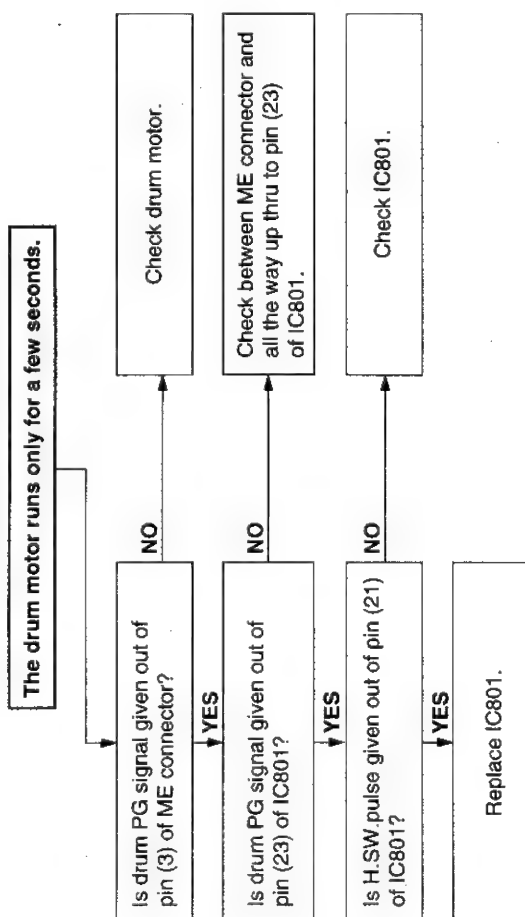


FLOW CHART NO.13 DRUM MOTOR TROUBLESHOOTING (1)

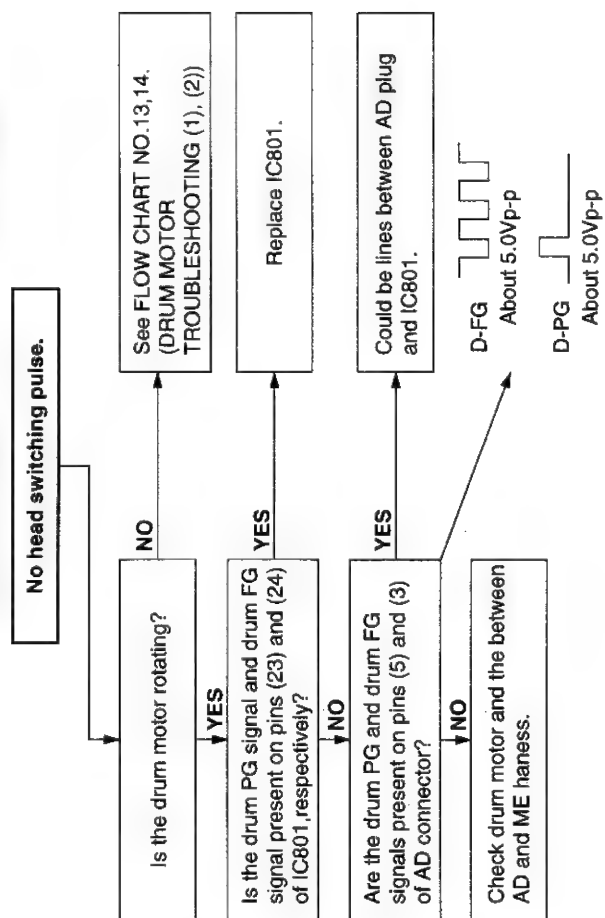
The drum motor fails to run.



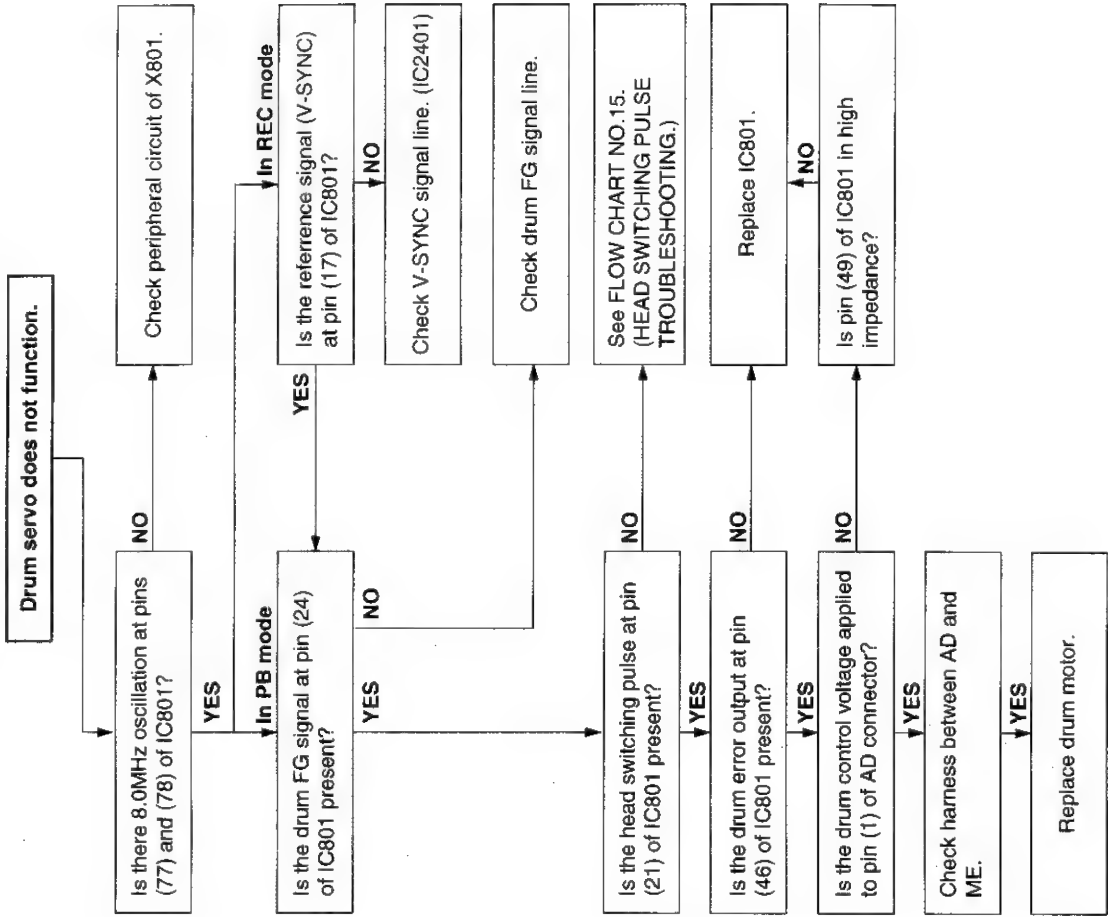
FLOW CHART NO.14 DRUM MOTOR TROUBLESHOOTING (2)



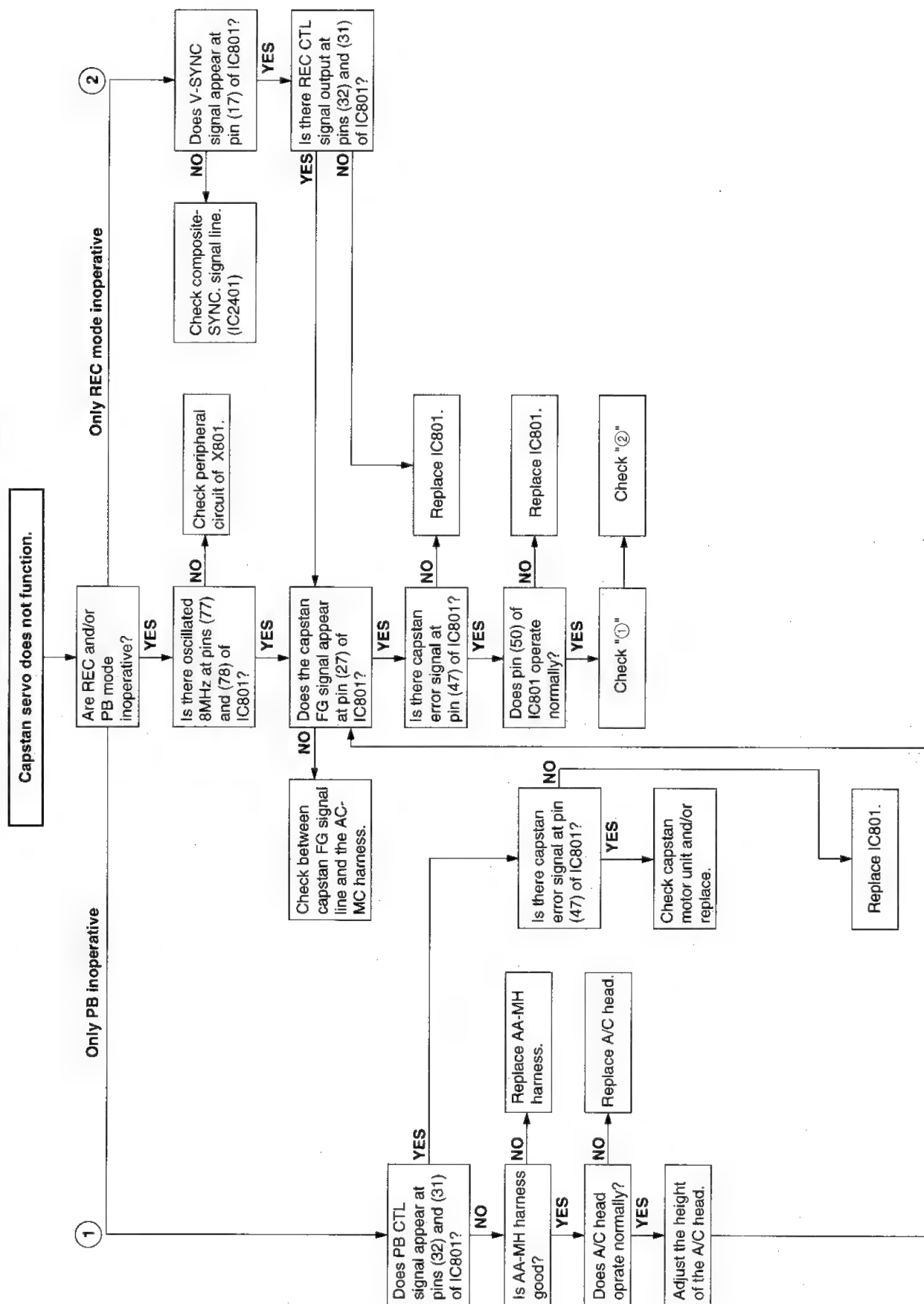
FLOW CHART NO.15 HEAD SWITCHING PULSE TROUBLESHOOTING.



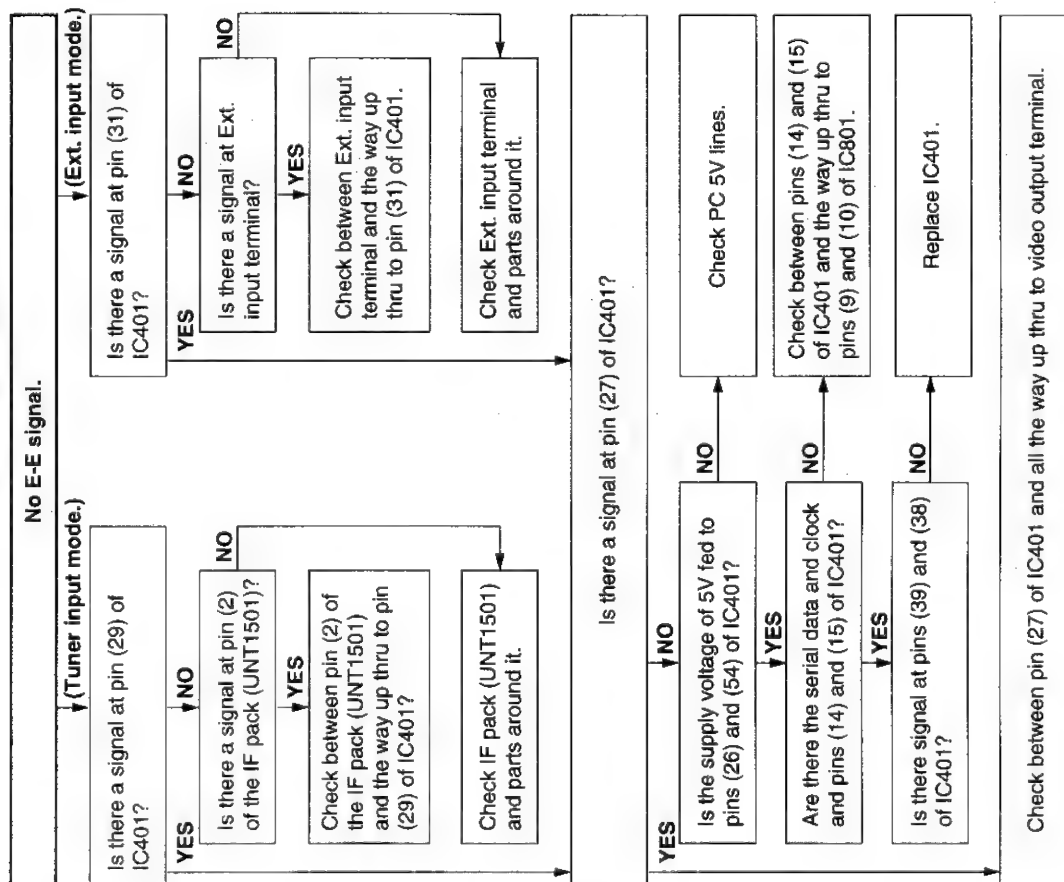
FLOW CHART NO.16 DRUM SERVO TROUBLESHOOTING



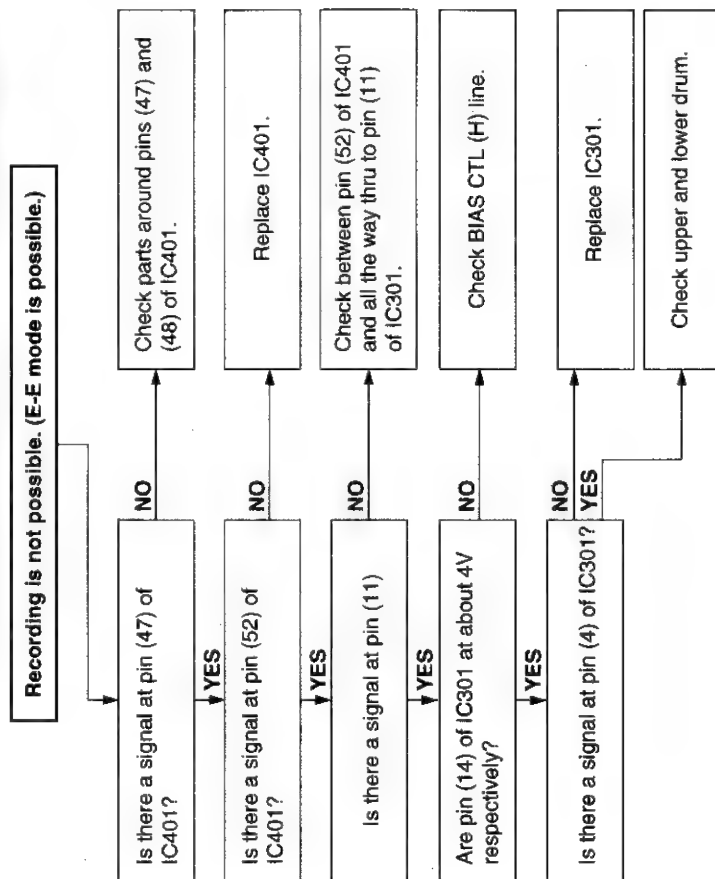
FLOW CHART NO.17 CAPSTAN SERVO TROUBLESHOOTING



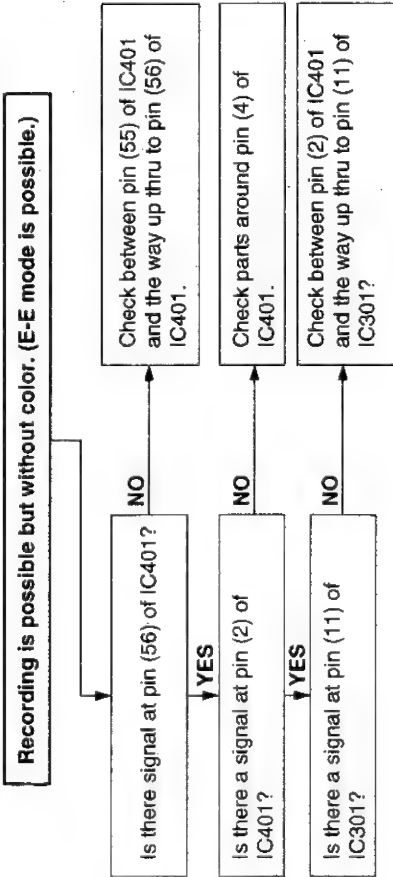
FLOW CHART NO.18 E-E MODE TROUBLESHOOTING



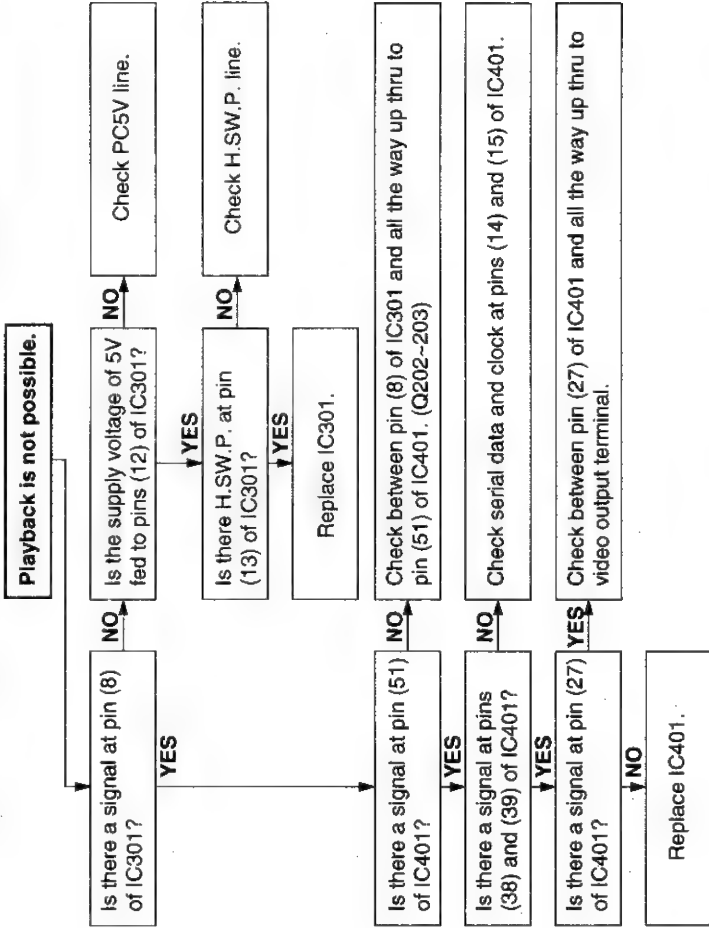
FLOW CHART NO.19 RECORDING MODE (LUMINANCE) TROUBLESHOOTING



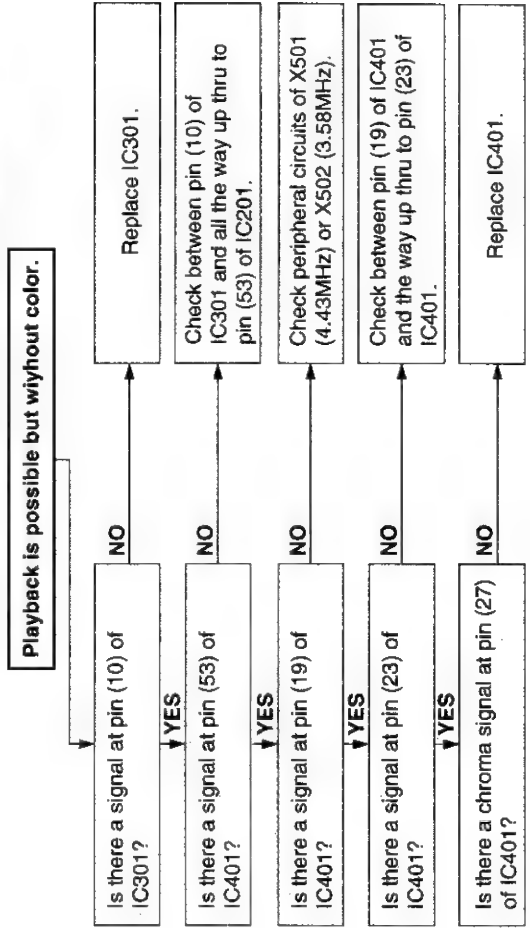
FLOW CHART NO.20 RECORDING MODE (CHROMA) TROUBLESHOOTING

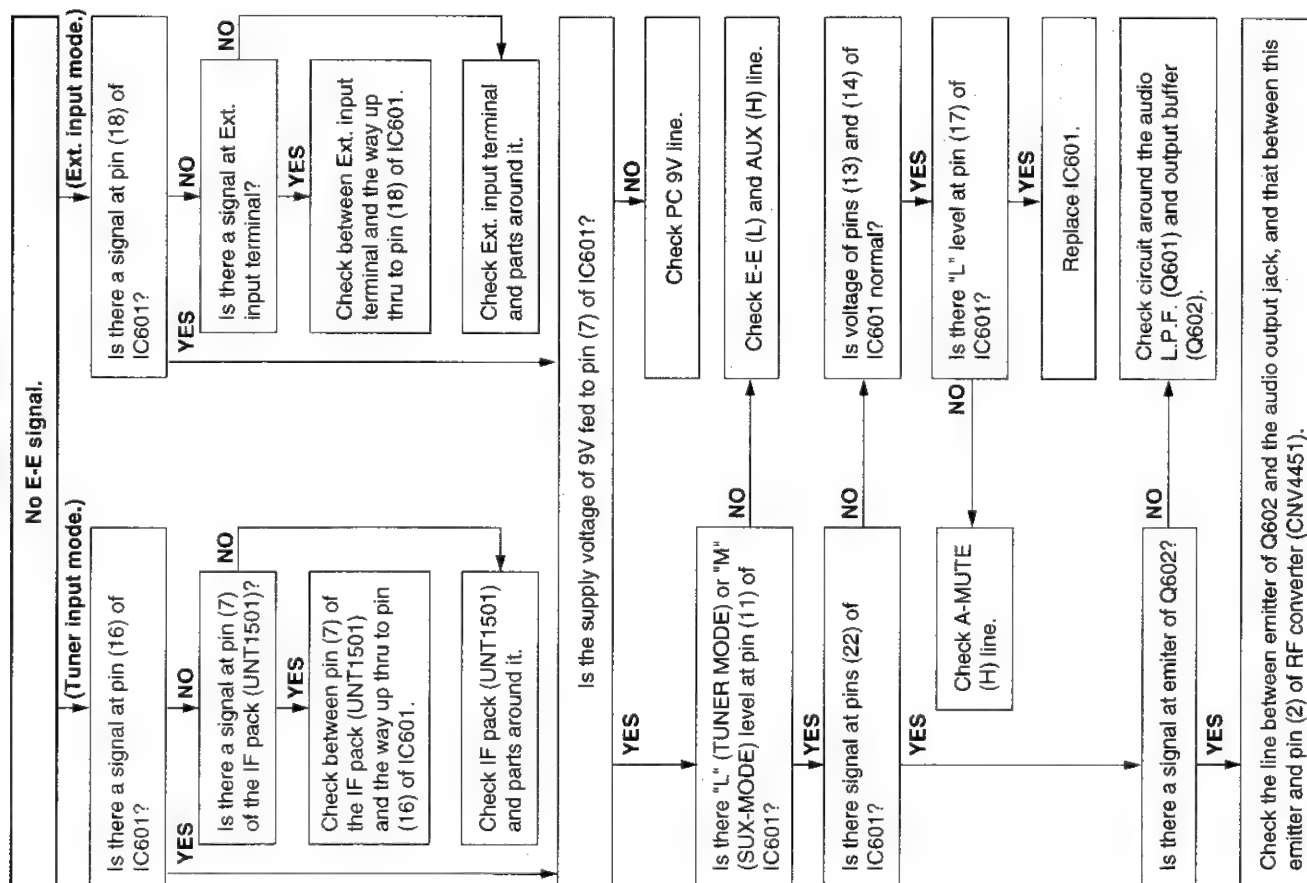


FLOW CHART NO.21 PLAYBACK MODE (LUMINANCE) TROUBLESHOOTING

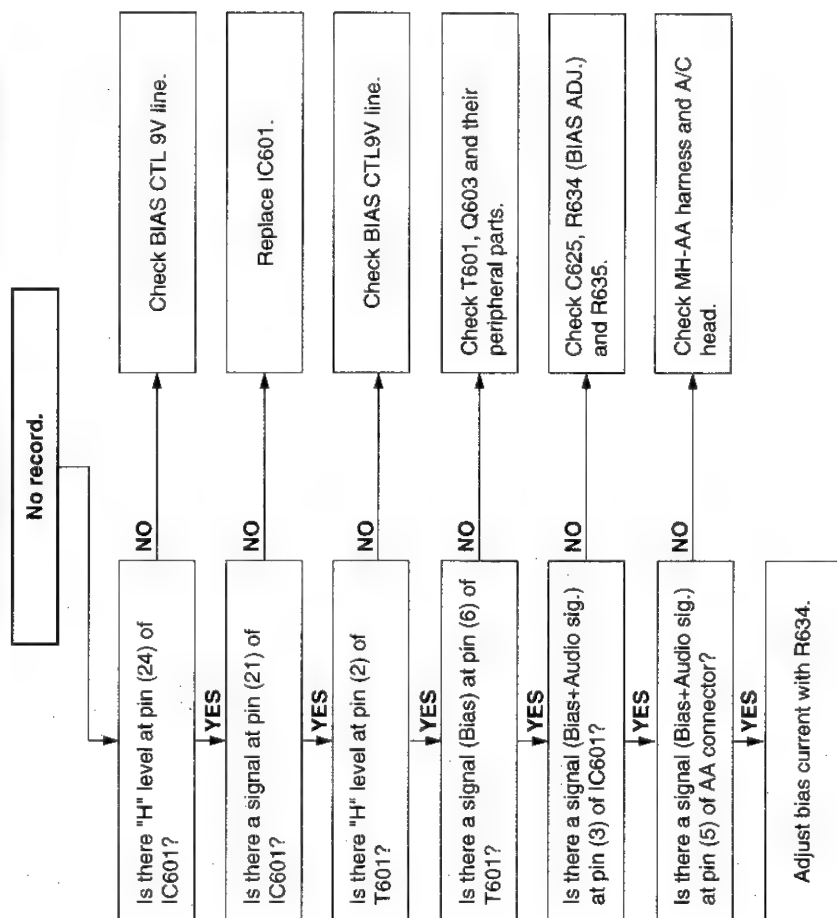


FLOW CHART NO.22 PLAYBACK MODE (CHROMA) TROUBLESHOOTING

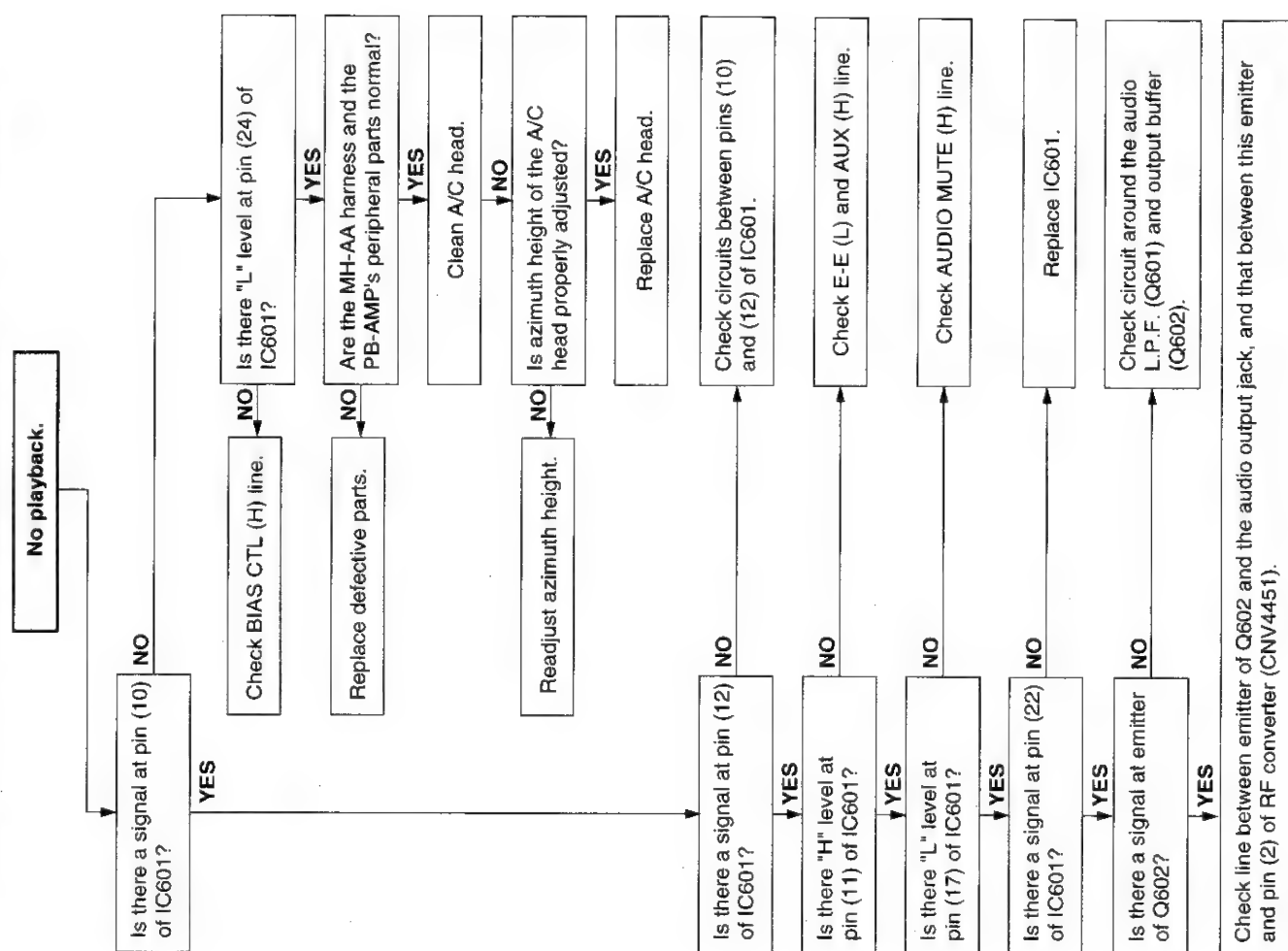




FLOW CHART NO.24 LINEAR SOUND RECORDING MODE TROUBLESHOOTING



FLOW CHART NO.25 LINEAR SOUND PLAYBACK MODE TROUBLESHOOTING



REPLACEMENT OF IC804 (E²PROM)

«Servicing precautions»

When the IC804 (E²PROM) has been replaced, make the following reprogramming.

Depending on models, the IC804 (E²PROM) has been factory adjusted for its memory function.

It's therefore necessary to reprogram the memory function for the model in question.

Note that the servo circuit requires readjustments for the slow and still modes.

Memory function reprogramming.

1. Check the power off. (power is standby mode)
2. Make for a moment short-circuit between TP5001 and TP5002, both located at the front side on the main PWB.
Be sure that all the fluorescent display tubes light up into the TEST mode.
3. Using the CHANNEL (+) and (–) buttons, select the right function numbers from among JP0-JP31, which appear in the fluorescent display tube, referring to the E²PROM map.
Press the DISPLAY button to pick up the functions (ON) and the CLEAR button to discard the functions (OFF).
DISPLAY and CLEAR buttons, are located on the remote control unit.
* When the DISPLAY button has been pressed (ON), the memory function No. starts flashing.
* When the CLEAR button has been pressed (OFF), the memory function No. lights up.
4. Make a short-circuit between TP5003 and TP5004, both located at the front side on the main PWB, and the settings will be displayed in hexadecimal notation.
Now you can see if the settings are correct.
5. Example: "ON" and "OFF" are taken as "1" and "0" respectively.

The numbers JP0 to JP31 are divided into four groups and each group's setting is displayed in hexadecimal notation.

| | | | | | | | | | | | | | | | |
|------------|-----|-----|-----|--------|-----|-----|-----|--------|-----|-----|-----|--------|-----|-----|-----|
| J31 | J30 | J29 | J28 | J27 | J26 | J25 | J24 | J23 | J22 | J21 | J20 | J19 | J18 | J17 | J16 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ↓ SPACE | | | | ↓ 0 | | | | ↓ 0 | | | | ↓ 0 | | | |
| J15 | J14 | J13 | J12 | J11 | J10 | J09 | J08 | J07 | J06 | J05 | J04 | J03 | J02 | J01 | J00 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| ↓ 0 | | | | ↓ 4 | | | | ↓ 0 | | | | ↓ D | | | |

"000040D" appears in the fluorescent display tube.

6. Finally make for a moment short-circuit between TP5001 and TP5002, both located at the front side on the main PWB to clear the TEST mode or press the OPERATE button to turn the power on.

ROM MAP

| | M201GM M20GM | M191SM M19SM | M20HM | M401SM M40SM | M211GM M21GM | M411GM M41GM | MH60GM | MH601GM | MH60SM | M21HM | M41HM | MH60HM | M21FPM M21FPM | M41FPM | M201FPM | M200BM | M400BM | M210BM | M410BM | MH60FPM |
|----------------------------------|-----------------|-----------------|---------|-----------------|-----------------|-----------------|---------|---------|---------|---------|---------|---------|------------------|---------|---------|---------|---------|---------|---------|---------|
| JP31 — | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 — | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 — | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28 — | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 27 NTSC PB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 VIDEO INSTANT WIPER REPLAY | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 25 HEAD 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 24 HEAD 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 Hi-Fi | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 22 AUTO CLOCK AUTO SORTING | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 21 DECODER | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 20 SHUTTLE | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 19 NICAM 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 18 NICAM 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 17 G-CODE 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 16 G-CODE 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 OEM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 LP | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 13 F-AM | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 12 2SCART | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 11 CATV/PIF | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 10 TUNER 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 9 TUNER 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 TUNER 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 7 SYSTEM 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 SYSTEM 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 VCR 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 VCR 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 3 PDC | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 VPS | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 COLOR 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 0 COLOR 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| DISPLAY | 030080D | 0300801 | 1104320 | 2304801 | 472080D | 672480D | 6F2780D | 6F2580D | 6FE780D | 5514320 | 6514320 | 6F9732C | 4721D12 | 6725D12 | 4301D12 | 0300801 | 2304801 | 4320801 | 6324801 | 6FE7D12 |

(Note: "1" : flashing "0" : lights up)

MEMO

Handwriting practice area with horizontal lines.

ROM MAP

| | M201GM | M191SM | M401SM | M211GM | M411GM | MH60GM | MH601GM | MH60SM | M211HM | M411HM | MH60HM | M211FPM | M411FPM | M201FPM | M200BM | M400BM | M210BM | M410BM | MH60FPM |
|------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| JP31 — | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 — | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 — | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28 — | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 27 NTSC PB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 VIDEO INSTANT | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| WIPER REPLAY | | | | | | | | | | | | | | | | | | | |
| 25 HEAD 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 24 HEAD 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 Hi-Fi | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 22 AUTO CLOCK | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| AUTO SORTING | | | | | | | | | | | | | | | | | | | |
| 21 DECODER | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 20 SHUTTLE | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 19 NICAM 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 18 NICAM 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 17 G-CODE 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 16 G-CODE 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 OEM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 LP | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 13 F-AV | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 12 2SCART | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 11 CATV/PIF | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 10 TUNER 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 9 TUNER 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 TUNER 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 7 SYSTEM 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 SYSTEM 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 VCR 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 VCR 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 3 PDC | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 VPS | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 COLOR 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 0 COLOR 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| DISPLAY | 030080D | 0300801 | 1104320 | 2304801 | 472080D | 672480D | 6F2780D | 6F2580D | 6FE780D | 6514320 | 6F9732C | 4721D12 | 6725D12 | 4301D12 | 0300801 | 2304801 | 4320801 | 6324801 | 6FE7D12 |

(Note: "1" : flashing "0" : lights up)

VORSICHTSMASSNAHMEN BEI DER WARTUNG VON PAL MS2-SYSTEM-MODELLEN

Montage der Platinen

Das grundlegende Montageverfahren für diese Modelle ist gleich wie bei den MS1-Modellen (1994er Modelle). Beziehen Sie sich z.B. auf das VC-A49GM-Handbuch.

(1) Von Hand eingesetzte Teile

Sicherstellen, daß die folgenden und andere von Hand eingesetzten Bauteile gut festsitzen:

Tuner, RCA-Buchse, 21polige Steckverbindung, Steckerfassung, Fernbedienungs-Empfangsteil, Abschirmgehäuse, Schalter, Mechanismus-Sensoren usw.

① Die allgemeinen Vorsichtsrichtlinien werden durch die Sicherheitsgruppe herausgegeben. Hierfür ist den "Sicherheits-Vorsichtsmaßnahmen" zu folgen. Sich ebenso vergewissern, ob die Primär-Kondensatoren C905, C906 und C915 (Teile vom Modell abhängig) gut festsitzen.

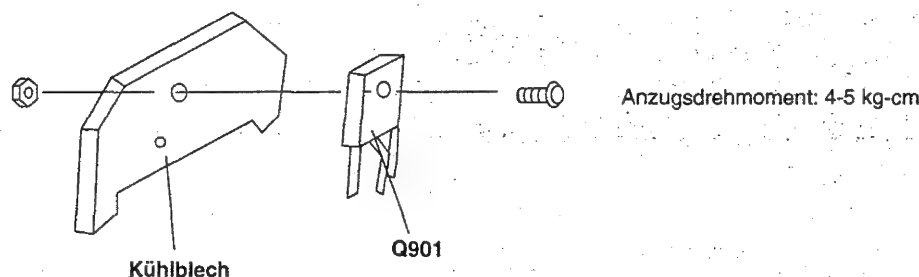
② Transformator und Schalttransistor

(Nur für Modelle: VC-MA31, MA221, MA441, MA51, MH83, VR136, MH93, MA63)

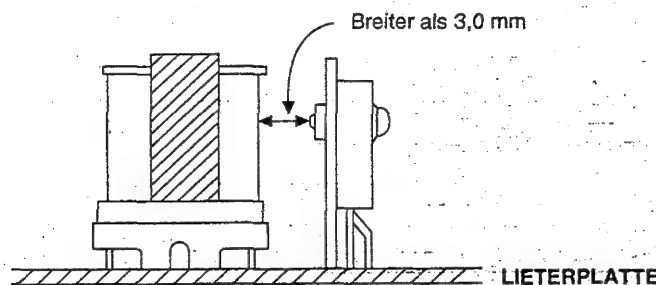
Die folgenden Anleitungsschritte sind für die oben erwähnten Modelle vorgesehen.

Montage des Transistors Q901 auf der Platine

[Vorbereitungsschritt] Den Q901 am Kühlblech befestigen.



Die oben erwähnte Transistor/Kühlblecheinheit an der Platine anbringen. Sicherstellen, daß zwischen der Befestigungsschraube des Q901 und dem Transformator T901 ein Abstand von über 3,0 mm besteht.

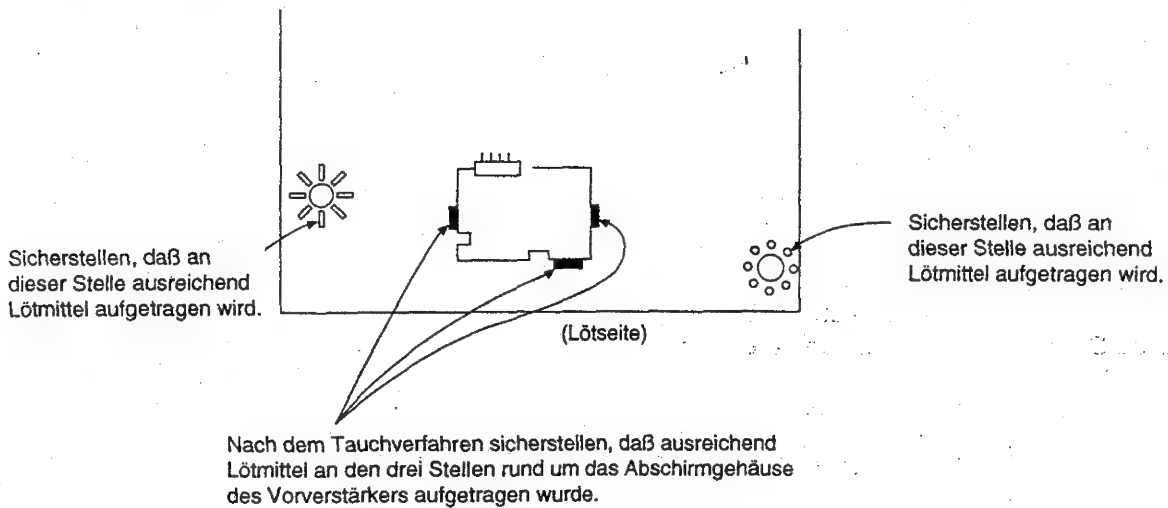


③ Alle Sensoren und Schalter sorgfältig handhaben (Startsensor, Endsensor, Nockenschalter, Spulensensor sowie Aufnahmespitzensensor).

* Der Vorbereitungsschritt für die Start- und Endsensoren ist gleich wie bei den MS1-Modellen.

(2) Gelötete Bauteile

- ① Der Platinen- zu Platinenanschlußstecker "AO", die RCA-Buchse sowie weitere Bauteile sind festgelötet.



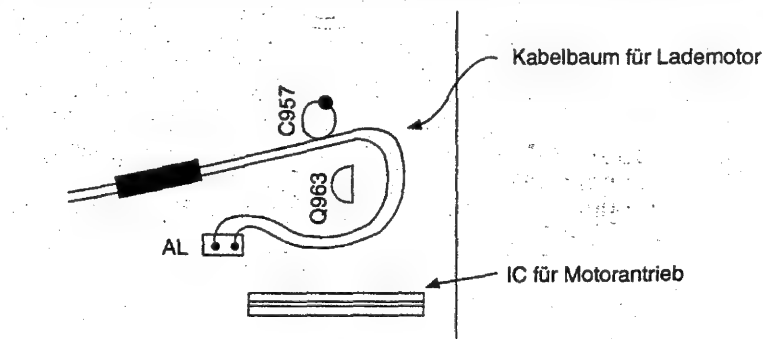
(3) Koaxialkabel (QCNW-0182AJZZ)

- ① Modelle: VC-A37X, VC-A37NZ, VC-A631X, VC-MA31E, VR-136, VC-M221, VC-MA441, VC-MA51
Das gerade Ende des Kabels an den Tuner und das L-Kabelende an den Wandler anschließen.
- ② Modelle: VC-M20GM, VC-M201GM, VC-M19SM, VC-M20HM, VC-M40SM, VC-M401SM, VC-M200BM, VC-M400BM
Das L-Kabelende an den Tuner und das gerade Ende des Kabels an den Wandler anschließen.

2. Montage des Chassis

(1) Verlegen der Kabel

- ① Darauf achten, daß die flexiblen Flachkabel nicht verkehrt herum angeschlossen werden. Ihre Anschlußstecker haben eine spezielle Form.
- ② Den Kabelbaum sorgfältig verlegen und darauf achten, daß dieser nicht zwischen dem Rahmen und dem Mechanismus (Laufwerksteuerung) eingeklemmt wird.
- ③ Sicherstellen, daß sämtliche Kabel gut festsitzen.
- ④ Das Kabel für den Lademotor zurechtbiegen, wie nachfolgend dargestellt.



(2) Montage des Mechanismus

- * Den Mechanismus anbringen und dabei besonders auf die Sensoren und den Aufnahmespitzenschalter achten. Die Sensoren immer von Staub, Fett usw. freihalten.
- * Den Antriebswellenmotor einbauen und auf korrekte Anschlüsse zwischen den Platine achten.

(3) Festziehen der Schrauben

- Den Anleitungsschritten der Mechanismusgruppe folgen.

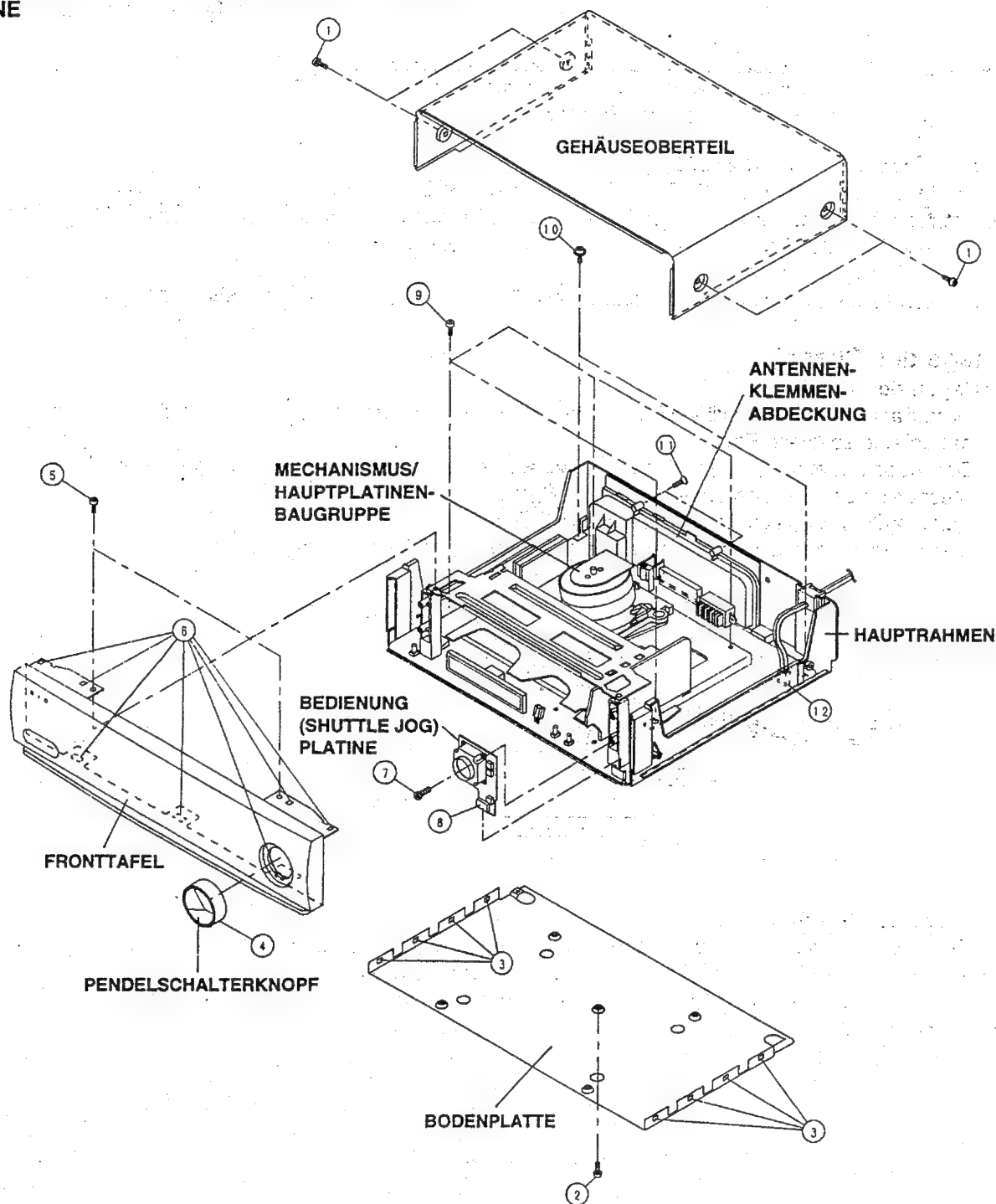
2. AUSBAU UND WEIDERZUSAMMENBAU

2-1 ZERLEGUNG DER WICHTIGSTEN BAUGRUPPEN

- GEHÄUSEOBERTEIL** : Die vier Schrauben ①.
BODENPLATTE : Die Schraube ② und die 8 Haken ③ entfernen.
FRONTTAFEL : Den Pendelschalterknopf ④ entfernen.
 Die beiden Schrauben ⑤ und die 7 Klammern ⑥ entfernen.
BEDIENUNG (SHUTTLE JOG) PLATINE : Die Schraube ⑦ entfernen.
 Der Verbinder ⑧ entfernen.

MECHANISMUS/ HAUPTPLATINEN- BAUGRUPPE

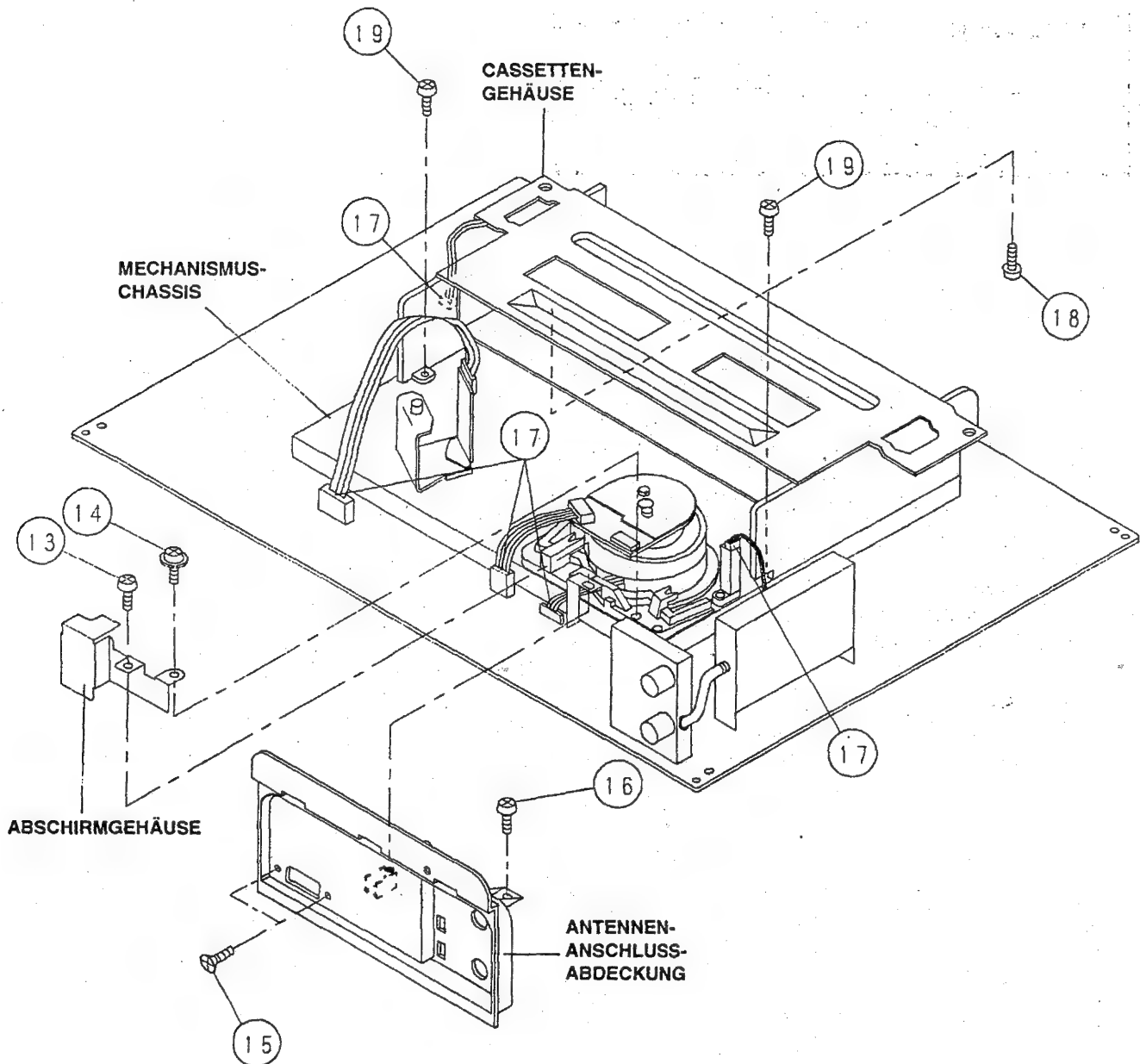
- : Die 4 Schrauben ⑨, die beiden Schrauben ⑩, die beiden Schrauben ⑪ und den Verbinder entfernen.
 Die Antennenklemmenabdeckung anheben und die Einheit aus dem Hauptrahmen herausnehmen.



2-2 ZERLEGUNG DER MECHANISMUS/HAUPTPLATINEN-BAUGRUPPE

- ABSCHIRMGEHÄUSE** : Die eins Schraube ⑬ und eins Schraube ⑭.
- ANTENNENANSCHLUSS-ABDECKUNG** : Die zwei Schrauben ⑮ und eins Schraube ⑯ losdrehen.
- MECHANISMUSCHASSIS/ CASSETTENGHÄUSE-BAUGRUPPE** : Drei flexible Flachkabel und zwei Kabelbäume ⑰ entfernen. Darauf achten, die Ober- und Unterseite der flexiblen Flachkabel nicht zu vertauschen.

- Die eins Schraube ⑱ losdrehen. Das Chassis/Cassettengehäuse vertikal anheben, um es von der Hauptplatine zu trennen.
- CASSETTEN-GEHÄUSE** : Die zwei Schrauben ⑲ losdrehen.



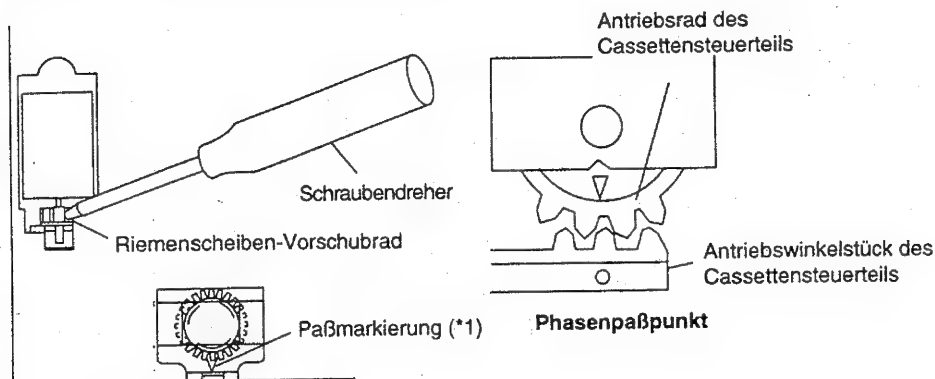
2-3 ZUR BEACHTUNG BEIM WIEDERZUSAMMENBAU

EINBAU DES CASSETTENSTEUERTEILS

Vor dem Einsetzen des Cassettensteuerteils in den Mechanismus muß die Anfangseinstellung erfolgen. Die Anfangseinstellung erfolgt auf zwei Weisen, elektrisch und mechanisch.

Elektrische Einstellung:

Mit einem 22-Ohm-Widerstand einen Kurzschluß zwischen TP5005 und TP5006, die sich beide an der Mitte der Hauptplatine befinden, herstellen und sicherstellen, daß der Mechanismus sich wieder in der Anfangseinstellposition befindet (*1). Dann das Cassettensteuerteil einsetzen. (Diese Methode wird angewendet, wenn der Mechanismus bereits auf die Platine gesetzt wurde.)



Mechanische Einstellung:

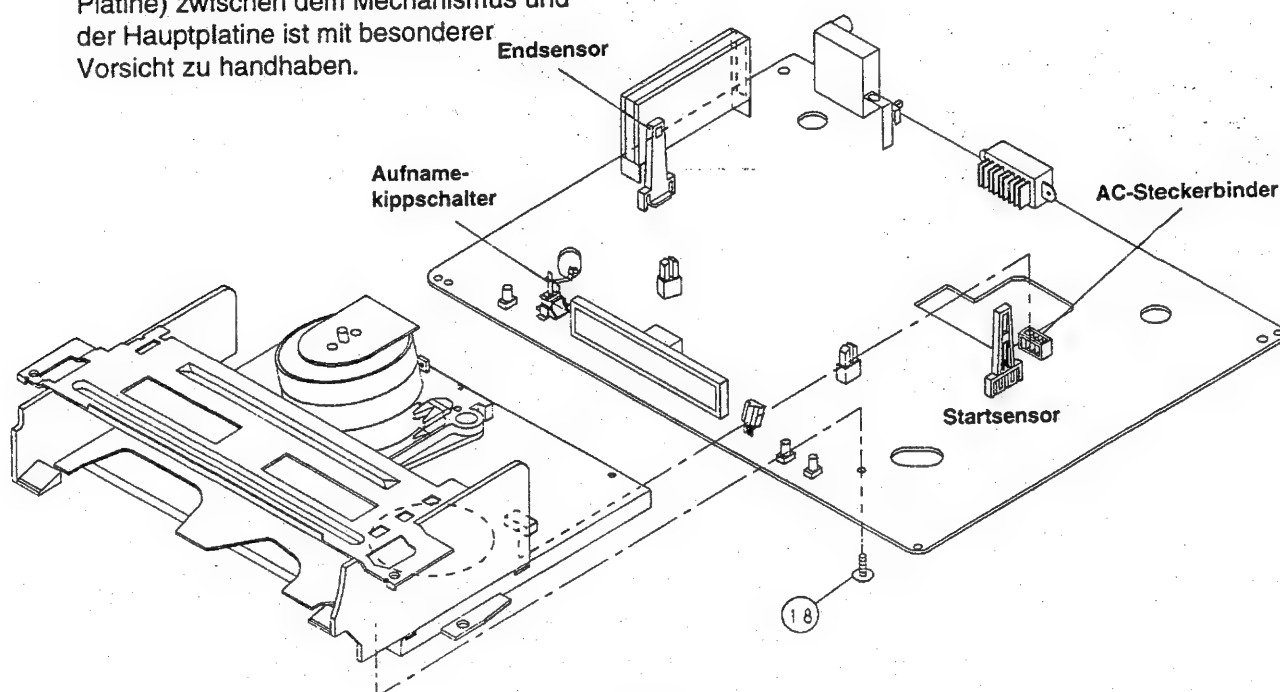
Das Riemenscheiben-Vorschubrad des Lademotors mit einem Schraubendreher drehen und sicherstellen, daß der Mechanismus sich wieder in der Anfangseinstellposition befindet (*1). Dann das Cassetten-steuerteil einsetzen. (Diese Methode ist für den alleinstehenden Mechanismus vorgesehen.)

VERBINDUNG DES MECHANISMUS MIT DER PLATINE

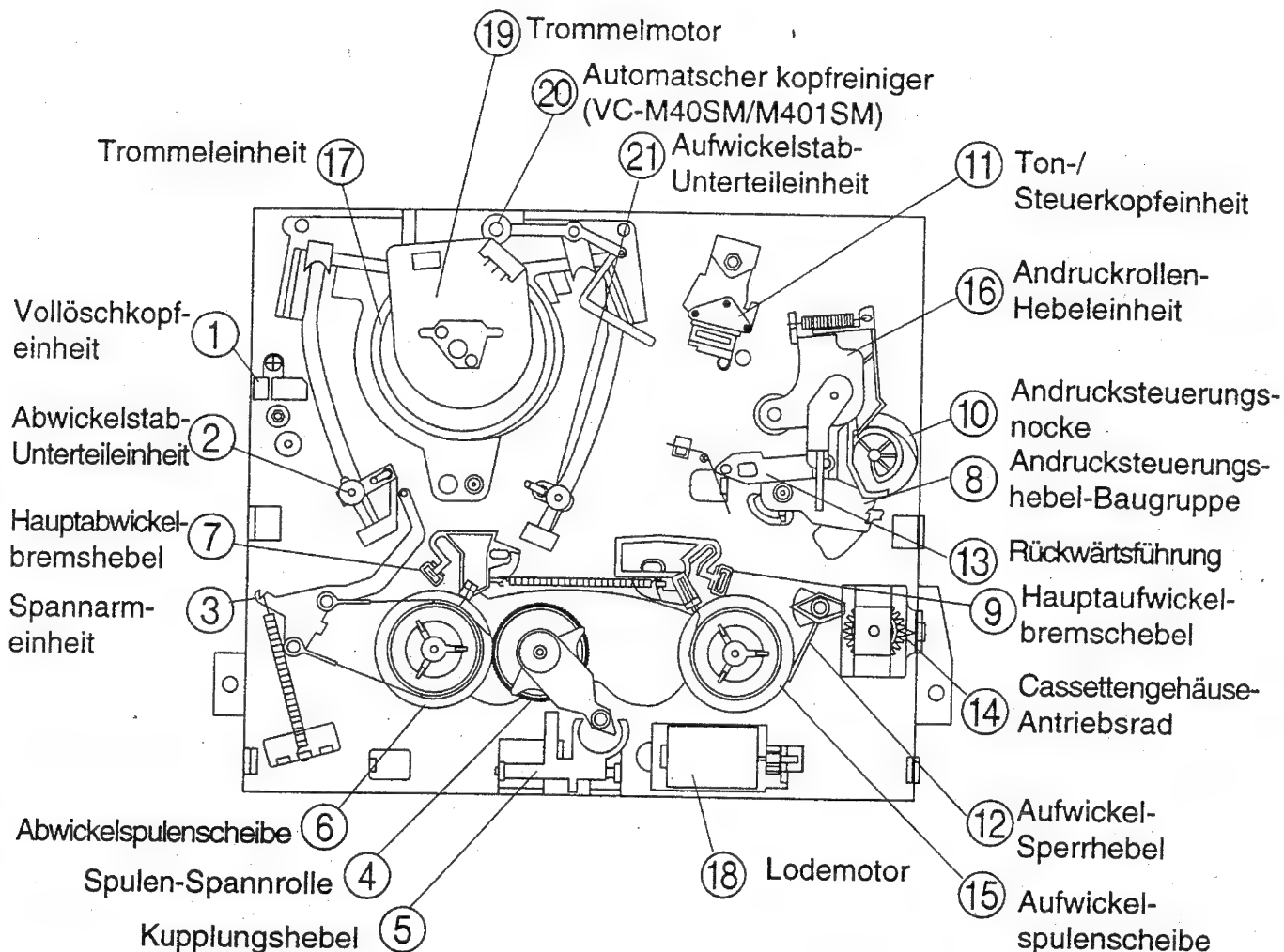
Die hervorstehenden Teile des Mechanismus mit den beiden Symbolen (rundes Bezugssymbol und ovales Zusatzbezugssymbol) auf der Hauptplatine ausrichten. Den Mechanismus gerade nach unten bringen, wobei darauf geachtet werden muß, daß die Außenkanten des Mechanismus keine der umgebenden Teile beschädigen. Die beiden Schrauben (eine zur Befestigung des Mechanismus und der Kopfverstärkerabschirmung, die andere auf der Lötseite der Hauptplatine in der Nähe des Lademotors) anziehen, um den Mechanismus und die Hauptplatine zu befestigen. Die flexiblen Flachkabel (AA, AD und AH) und die Kabelbäume (AE und AL) zwischen dem Mechanismus und der Hauptplatine wieder anschließen.

Teile, auf die geachtet werden muß:

- Start- und Endsensoren Q852, Q853
- Aufnahmekippschalter S851
- Der Steckverbinder MC-AC (Platine zu Platine) zwischen dem Mechanismus und der Hauptplatine ist mit besonderer Vorsicht zu handhaben.

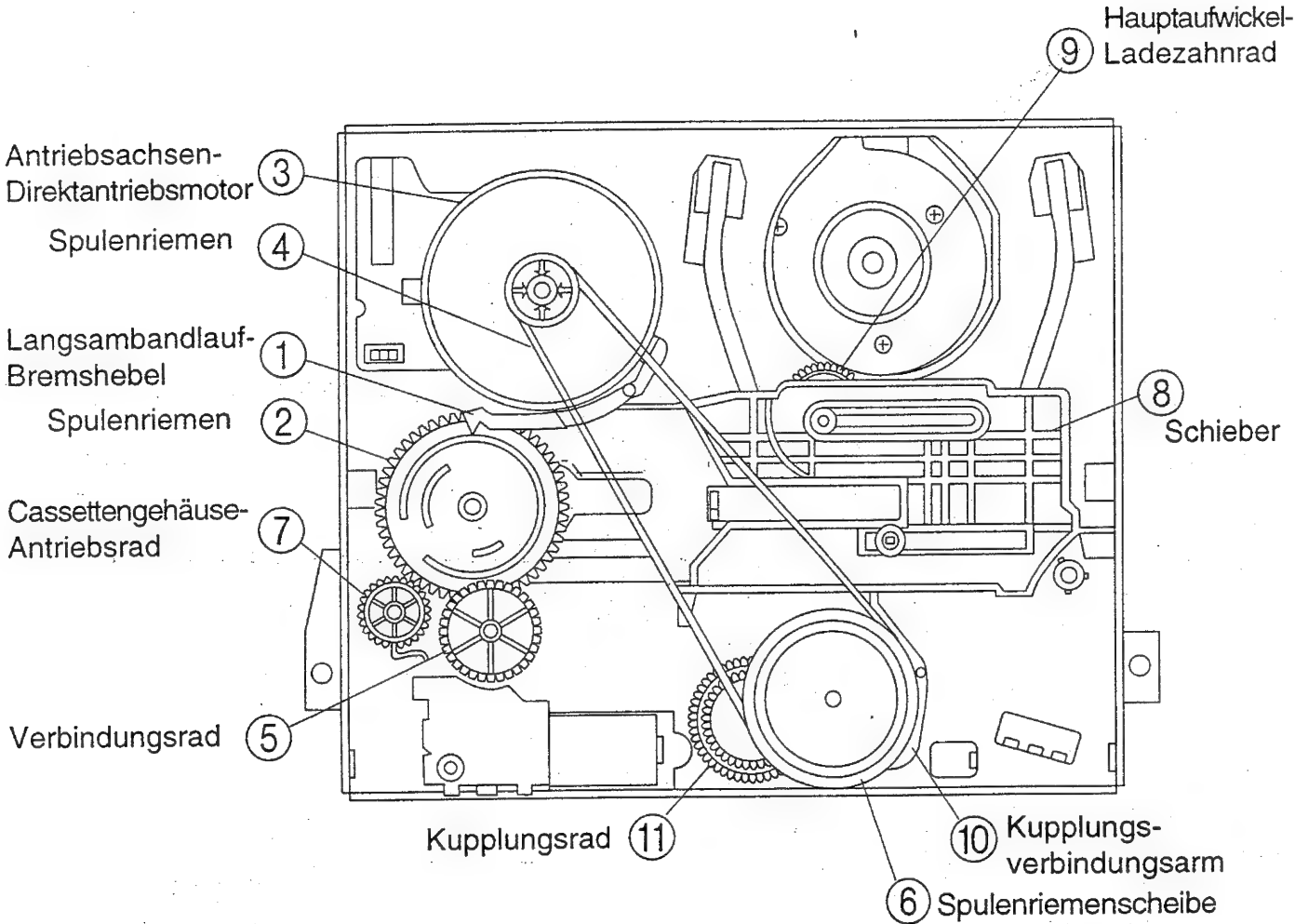


3. FUNKTIONEN DER WICHTIGSTEN MECHANISCHEN TEILE (DRAUFSICHT)



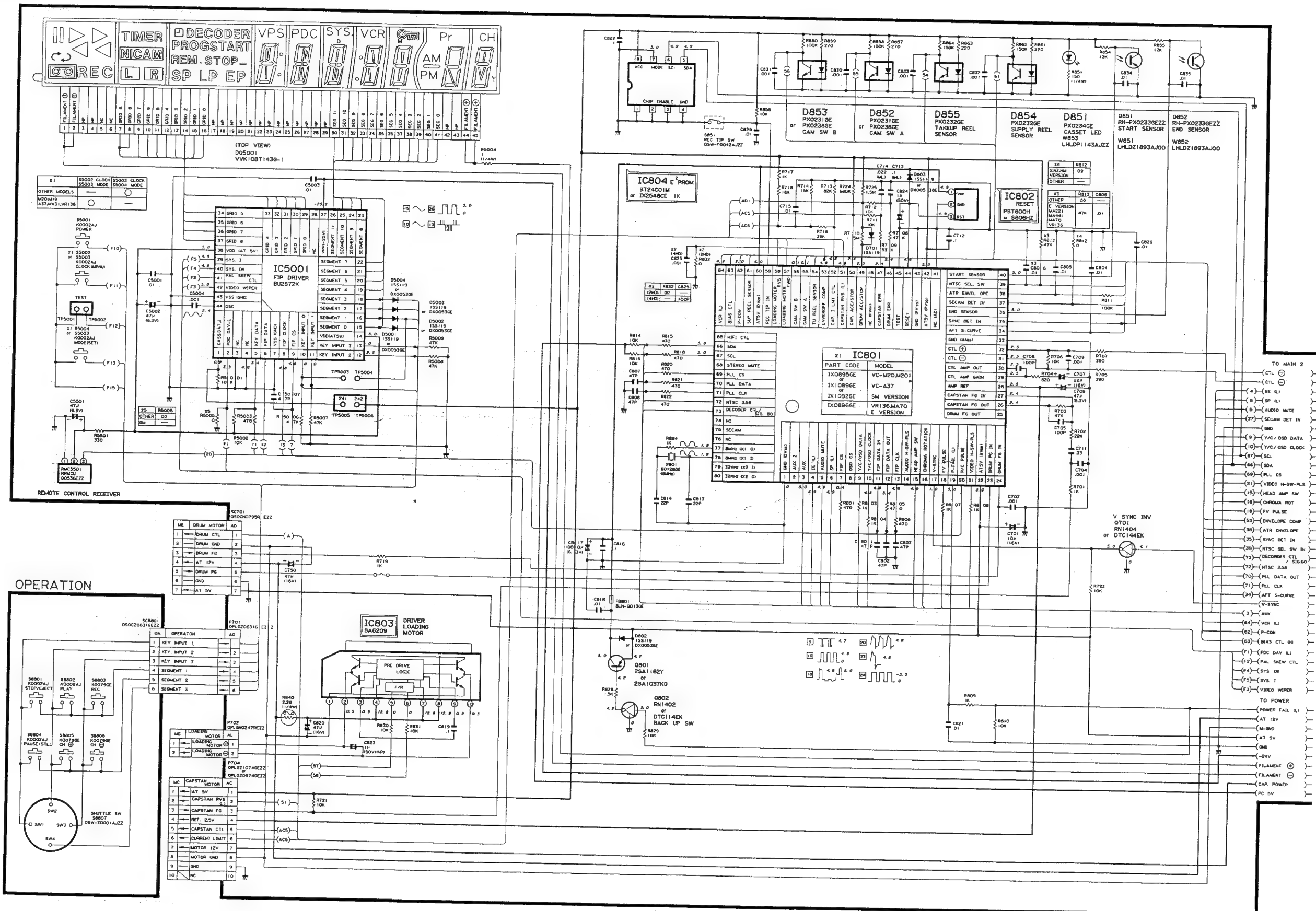
| Nr. | Funktion | Nr. | Funktion |
|-----|--|-----|---|
| 1. | Volllöschkopfeinheit Alle Bandaufzeichnungen in der Aufnahme-Betriebsart löschen. | 13. | Rücklaufführung Zieht das Band in der Bildsuchrücklauf-Betriebsart heraus und steuert mit den oberen und unteren Führungen die Bandantriebshöhe. |
| 3. | Spannarmeinheit Ermittelt die Bandspannung während des Bandlaufs und bremst die Abwickelspulenscheibe via das Spannband. | 16. | Andruckrollen-Hebeleinheit Drückt das Band während des Bandlaufs an die Antriebsachse. Der rechte Zapfen schaltet die Kupplung der Cassettengehäusesteuerung auf "Cassettenauswurf". Die Cassette wird daraufhin aus dem Bandlaufwerk ausgestoßen. |
| 7. | Hauptabwickelbremshebel Bremst die Abwickelspulenscheibe, um beim Stoppen in den Betriebsarten Bandvorlauf und Bandrücklauf einen Banddurchhang zu vermeiden. | 18. | Lademotor Mechanischer Antrieb des Laufwerks. Die Kraft wird über einen Riemenantrieb auf den Hauptnocken und die Cassettengehäusesteuerung übertragen. |
| 9. | Hauptaufwickelbremshebel Bremst die Aufwickelspulenscheibe, um beim Stoppen in den Betriebsarten Bandvorlauf und Bandrücklauf einen Banddurchhang zu vermeiden. | | |

**FUNKTIONEN DER WICHTIGSTEN MECHANISCHEN TEILE
(ANSICHT VON UNTEN)**



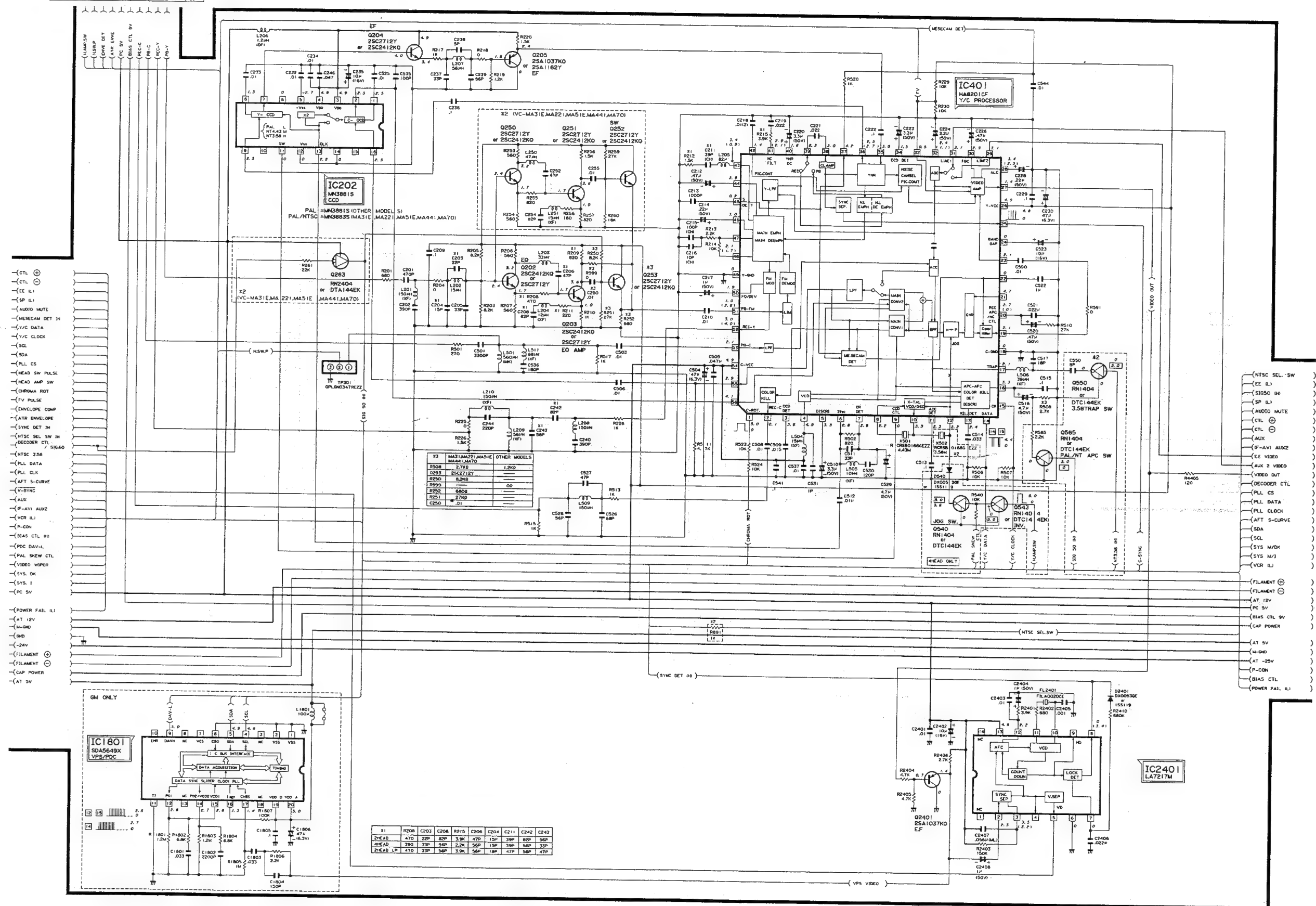
| Nr. | Funktion | Nr. | Funktion |
|-----|--|-----|---|
| 1. | Langsambandlaufhebel Berührt in der Zeitlupen-/Standbild-Betriebsart den mit dem Hauptnocken verbundenen Antriebsachsen-Direktantriebsmotor und bremst ihn zu einem bestimmten Grad ab. | 6. | Spulenscheibe Überträgt die Kraft des Antriebsachsen-Direktantriebs-motors via das Spulenzwischenrad auf die Spulenscheibe. |
| 3. | Antriebsachsen-Direktantriebsmotor Mechanischer Antrieb des Laufwerks. Die Kraft wird über einen Riemenantrieb übertragen. | 8. | Schieber Überträgt die Tätigkeit des Hauptnockens auf das Brems-und Laderad. |
| 4. | Spulenriemen Überträgt die Kraft, um das Band zur Spulenscheibe zu befördern. | 9. | Hauptaufwickel-Ladezahnrad Schaltet den Aufwickelstab-Unterteil und die Führungsrolle durch das Lade-Übertragungszahnrad um und legt das Band um die Trommel. Ferner überträgt das Ladezahnrad die Kraft auf das Abwickel-Ladezahnrad. |

9. CIRCUIT DIAGRAM AND PWB FOIL PATTERN MAIN (1) / OPERATION CIRCUIT



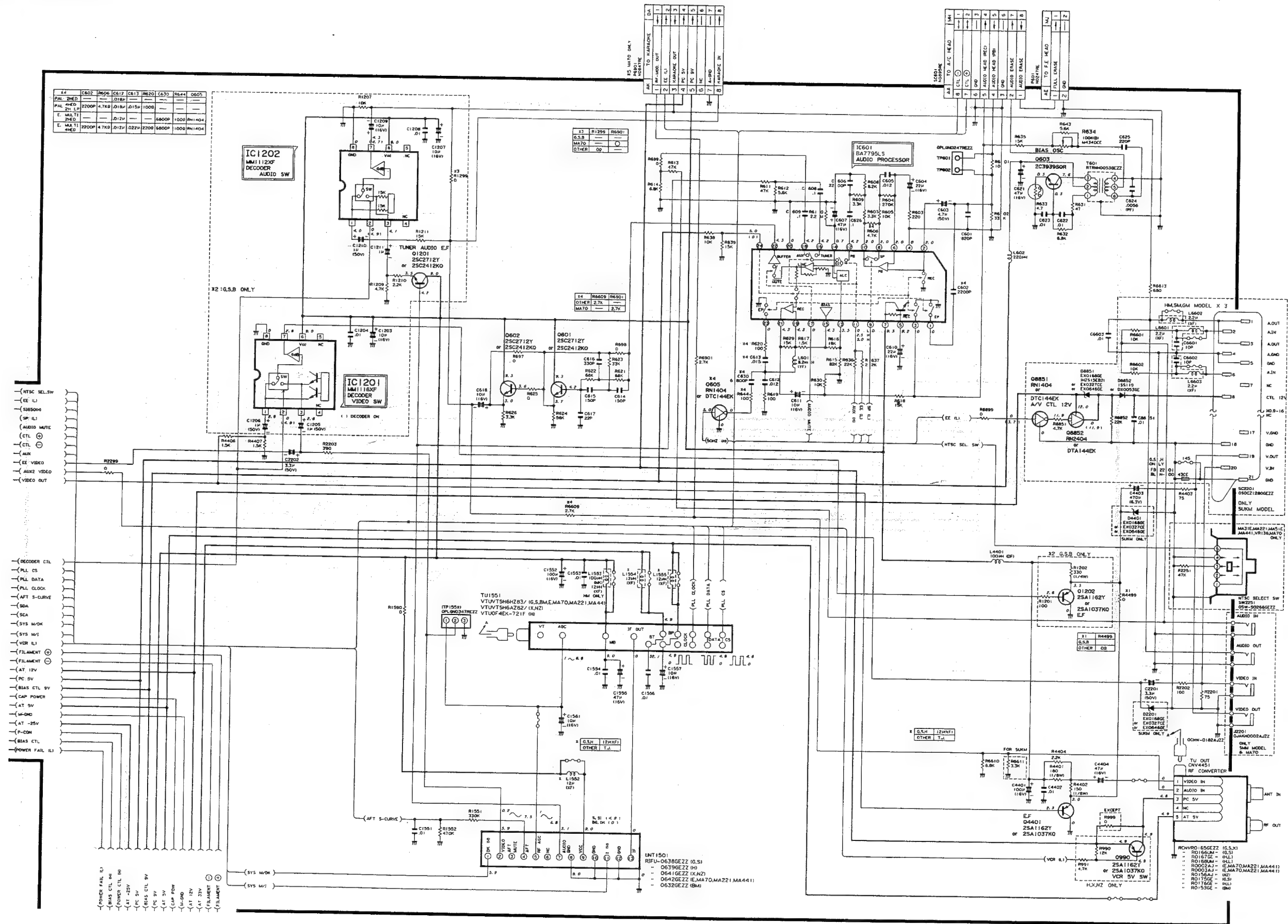
* VOLTAGE MEASUREMENT MODE
PB Parentheses ()
REC Without Parentheses

| TI | R209 | R208 | R212 | R211 | C243 | C206 | C211 |
|-----------|------|------|------|------|------|------|------|
| 2+0 | 820 | 560 | 1.5K | 150 | 47P | 56P | 39P |
| 4+0 | 820 | 470 | 1.5K | 150 | 33P | 47P | 56P |
| 2+0 (LPI) | 820 | 560 | 1.5K | 150 | 33P | 56P | 39P |



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MAIN (3) CIRCUIT

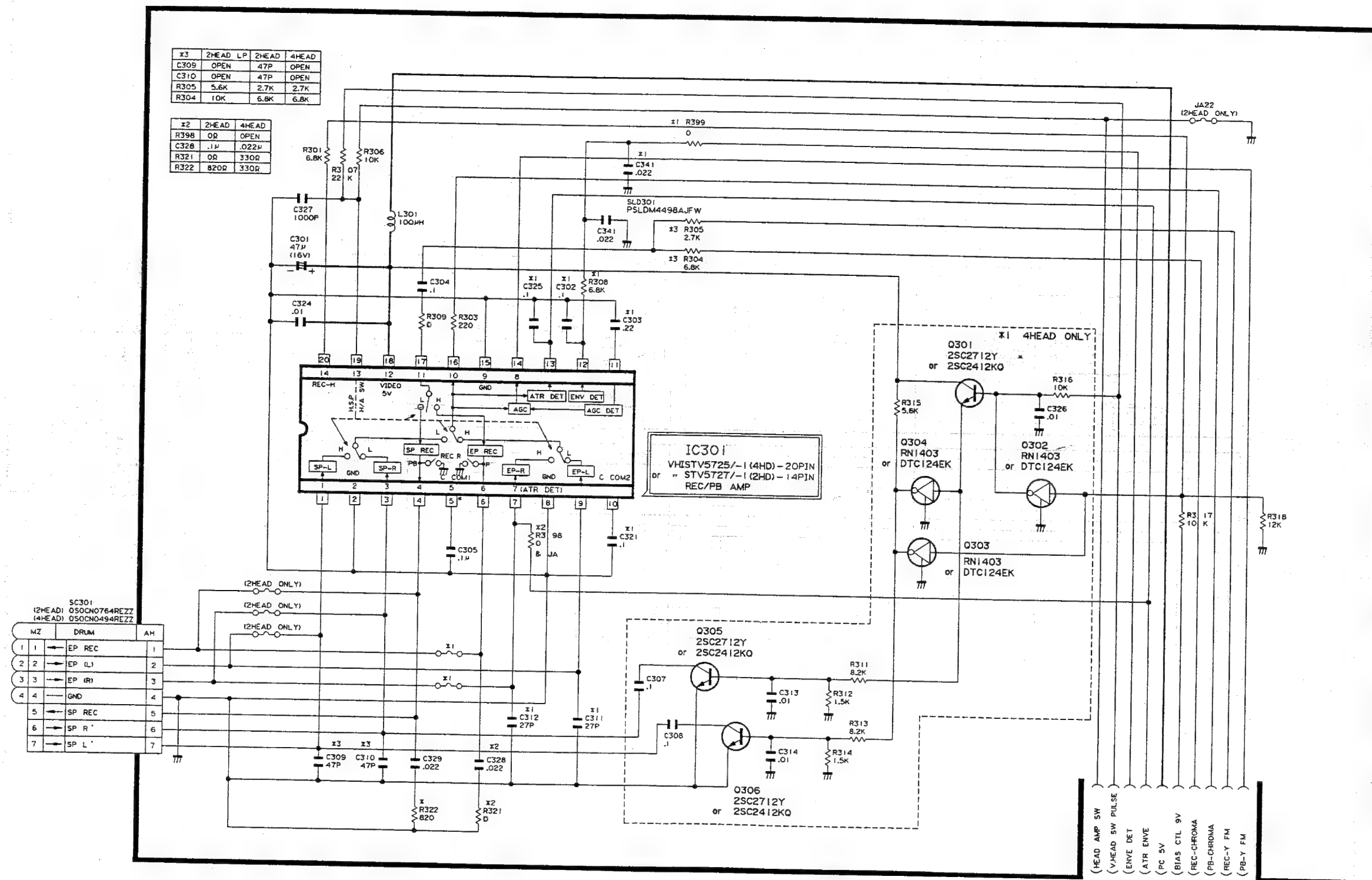


* VOLTAGE MEASUREMENT MODE

PB Parentheses ()

REC Without Parentheses

MAIN (4) CIRCUIT

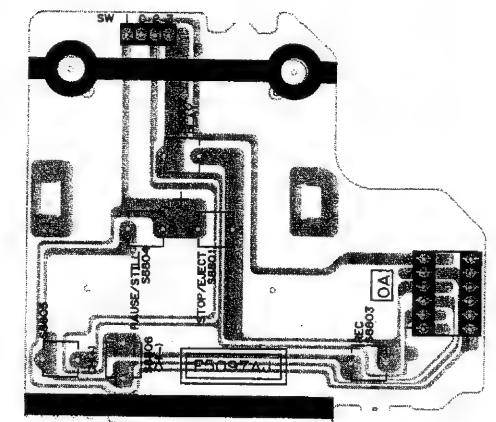
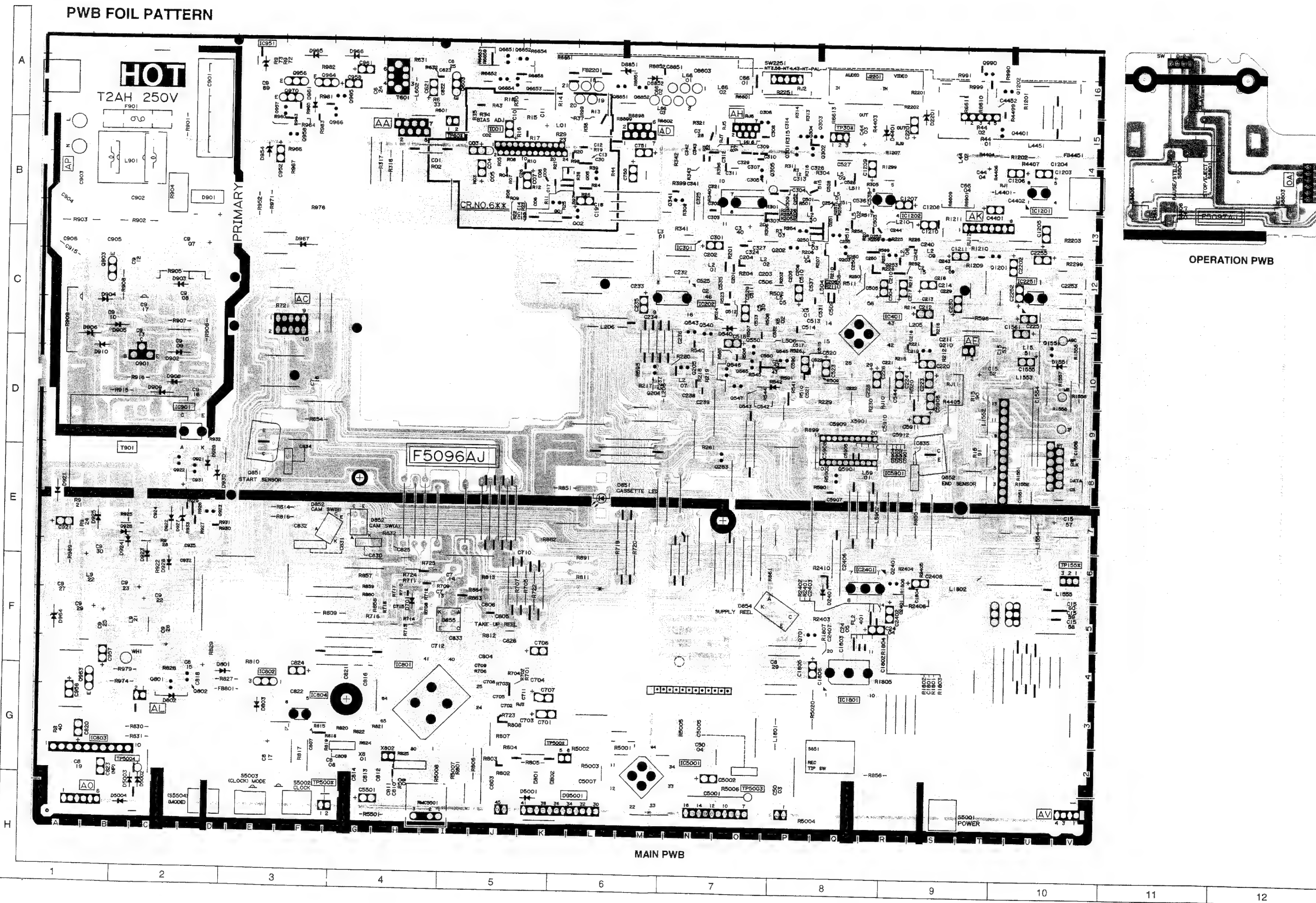


SC301
12HEAD: 050CNO764REZZ
14HEAD: 050CNO494REZZ

| NZ | DRUM | AH |
|----|--------|----|
| 1 | EP REC | 1 |
| 2 | EP (L) | 2 |
| 3 | EP (R) | 3 |
| 4 | GND | 4 |
| 5 | SP REC | 5 |
| 6 | SP R | 6 |
| 7 | SP L | 7 |

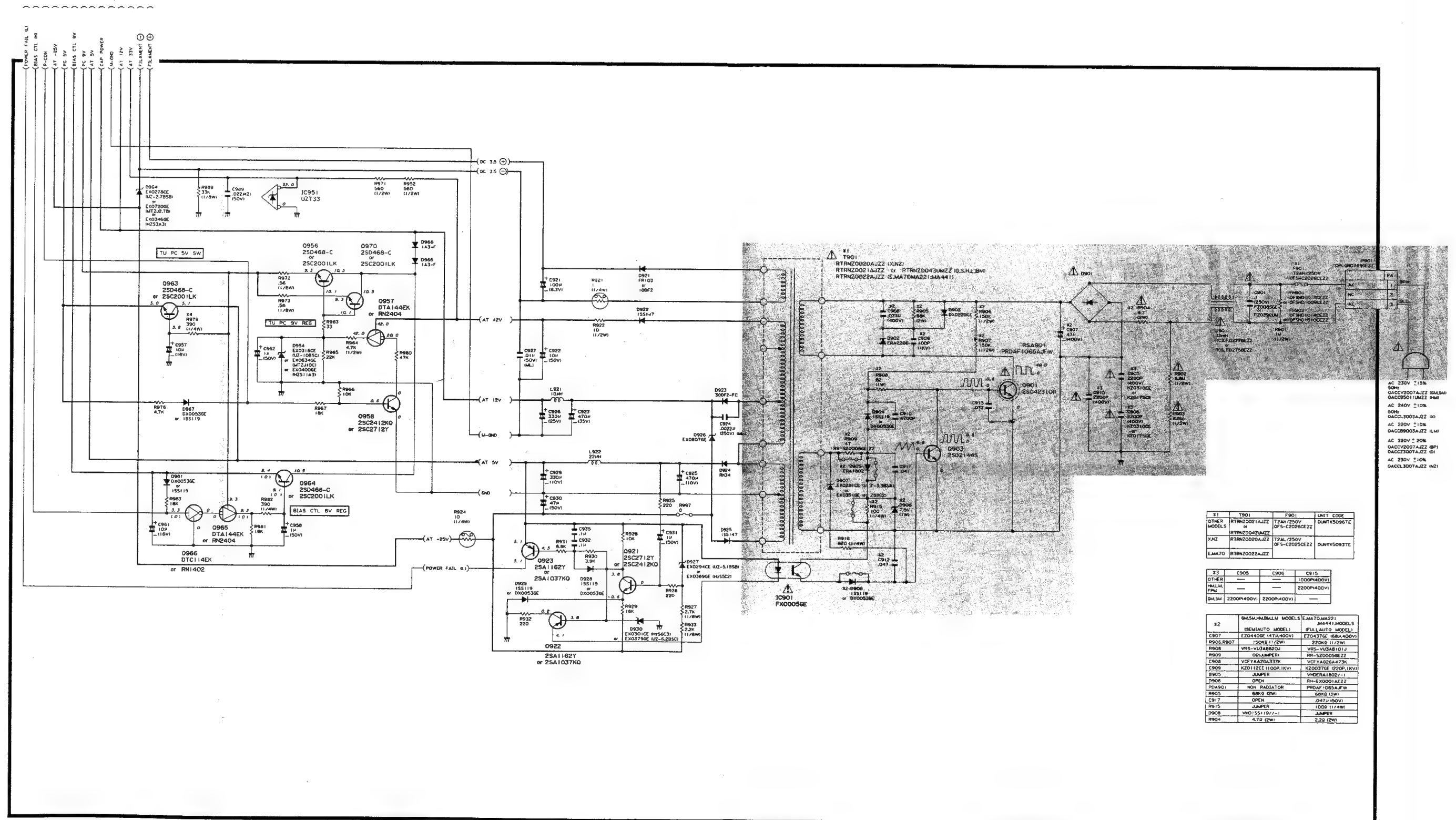
* VOLTAGE MEASUREMENT MODE
PB Parentheses ()
REC Without Parentheses

PWB FOIL PATTERN



OPERATION PWB

| |
|---|
| A |
| B |
| C |
| D |
| E |
| F |
| G |
| H |



*** VOLTAGE MEASUREMENT MODE**
PB Parentheses ()
REC Without Parentheses

10. REPLACEMENT PARTS LIST

PARTS REPLACEMENT

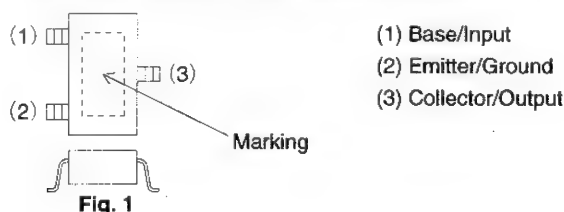
Many electrical and mechanical parts in video cassette recorder have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual; electrical components having such features are identified by \triangle and shaded areas in the Replacement Parts Lists and Schematic Diagrams. The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

- | | |
|-----------------|----------------|
| 1. MODEL NUMBER | 2. REF. NO. |
| 3. PART NO. | 4. DESCRIPTION |
| 5. PRICE CODE | |

HOW TO IDENTIFY CHIP TRANSISTORS AND DIODES BY ITS MARKING



| Package | Marking | Parts No. |
|---------|---------|----------------|
| Fig. 1 | 25 | VS DTC124EK/-1 |
| Fig. 1 | 24 | VS DTC114EK/-1 |
| Fig. 1 | 26 | VS DTC144EK/-1 |
| Fig. 1 | 16 | VS DTA144EK/-1 |
| Fig. 1 | BQ | VS2SC2412KQ-1 |
| Fig. 1 | FQ | VS2SA1037KQ-1 |

MARK ★: SPARE PARTS-DELIVERY SECTION.

| Ref. No. | Part No. | ★ | Description | Code |
|----------|----------|---|-------------|------|
|----------|----------|---|-------------|------|

PRINTED WIRING BOARD ASSEMBLIES

(NOT REPLACEMENT ITEM)

| | | | |
|---------------|---|----------------|-----|
| DUNTK5096TEV1 | - | Main Unit | --- |
| DUNTK5097TEV0 | - | Operation Unit | --- |

| Ref. No. | Part No. | ★ | Description | Code |
|----------|----------|---|-------------|------|
|----------|----------|---|-------------|------|

DUNTK5096TEV1

MAIN UNIT ASSEMBLY

TUNER AND ASSEMBLY

| | | | | |
|---------|---------------|---|--------------|--|
| CNV4451 | RCNVR0168UMZZ | U | RF Converter | |
| TU1551 | VTU0F4EK-721F | J | Tuner | |
| UNT1501 | RiFU-0639GEZZ | J | IF-Pack Unit | |

INTEGRATED CIRCUITS

| | | | | |
|--------|---------------|---|----------------------|----|
| IC202 | VHiMN3881S/1E | J | CCD | |
| IC301 | VHiSTV5727/-1 | J | REC/PB Amp. | |
| IC401 | VHiHA8201CF-1 | J | Y/C Processor | |
| IC601 | VHiBA7795LS-1 | J | Audio Processor | AG |
| IC801 | RH-iX0895GEZZ | J | Syscon/Servo/Timer | |
| IC802 | VHiPST600H/-1 | J | Reset | AE |
| IC803 | VHiBA6209//1E | J | Loading Motor Driver | AG |
| IC804 | VHiST24C01M-1 | J | E ² PROM | |
| IC951 | VHiUZT33///-1 | J | I.C. | AC |
| IC2401 | VHiLA7217M/-1 | J | I.C. | AG |
| IC5001 | VHiBU2872K/-1 | J | FIP Driver | |

TRANSISTORS

| | | | | |
|------------------|---------------|---|------------|----|
| Q202 | VS2SC2412KQ-1 | J | 2SC2412KQ | AA |
| Q203 | VS2SC2412KQ-1 | J | 2SC2412KQ | AA |
| Q204 | VS2SC2412KQ-1 | J | 2SC2412KQ | AA |
| Q205 | VS2SA1037KQ-1 | J | 2SA1037KQ | AA |
| Q601 | VS2SC2412KQ-1 | J | 2SC2412KQ | AA |
| Q602 | VS2SC2412KQ-1 | J | 2SC2412KQ | AA |
| Q603 | VS2C3939SQR1E | J | 2SC3939SQR | AC |
| Q701 | VSDTC144EK/-1 | J | DTC144EK | AB |
| Q801 | VS2SA1037KQ-1 | J | 2SA1037KQ | AA |
| Q802 | VSDTC114EK/-1 | J | DTC114EK | AB |
| \triangle Q901 | VS2SC4231QR-3 | J | 2SC4231QR | AH |
| \triangle Q903 | VS2SD2144S/-1 | J | 2SD2144S | AC |
| Q921 | VS2SC2412KQ-1 | J | 2SC2412KQ | AA |
| Q922 | VS2SA1037KQ-1 | J | 2SA1037KQ | AA |
| Q923 | VS2SA1037KQ-1 | J | 2SA1037KQ | AA |
| Q956 | VS2SC2001LK-1 | J | 2SC2001LK | AA |
| Q957 | VSDTA144EK/-1 | J | DTA144EK | AC |
| Q958 | VS2SC2412KQ-1 | J | 2SC2412KQ | AA |
| Q963 | VS2SC2001LK-1 | J | 2SC2001LK | AA |
| Q964 | VS2SC2001LK-1 | J | 2SC2001LK | AA |
| Q965 | VSDTA144EK/-1 | J | DTA144EK | AC |
| Q966 | VSDTC114EK/-1 | J | DTC114EK | AB |
| Q970 | VS2SC2001LK-1 | J | 2SC2001LK | AA |
| Q990 | VS2SA1037KQ-1 | J | 2SA1037KQ | AA |
| Q2401 | VS2SA1037KQ-1 | J | 2SA1037KQ | AA |
| Q4401 | VS2SA1037KQ-1 | J | 2SA1037KQ | AA |
| Q8851 | VSDTC144EK/-1 | J | DTC144EK | AB |
| Q8852 | VSDTA144EK/-1 | J | DTA144EK | AC |

| Ref. No. | Part No. | ★ | Description | Code |
|---------------|----------------|---|---------------------|------|
| DIODES | | | | |
| D701 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D802 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D803 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D851 | RH-PX0234GEZZ | J | Cassette LED | AD |
| D852 | RH-PX0238GEZZ | J | Cam Switch A | AF |
| D853 | RH-PX0238GEZZ | J | Cam Switch B | AF |
| D854 | RH-PX0232GEZZ | J | Supply Reel Sensor | AF |
| D855 | RH-PX0232GEZZ | J | Take-up Reel Sensor | AF |
| △ D901 | RH-DX0083GEZZ | J | Diode Bridge | AC |
| △ D902 | VHDERA2206/-1 | J | ERA2206 | AC |
| △ D903 | RH-DX0220CEZZ | J | Diode | AB |
| △ D904 | RH-DX0053GEZZ | J | 1SS132 | AB |
| △ D907 | RH-DX0053GEZZ | J | 1SS132 | AA |
| △ D908 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D921 | VHDFR103///-1 | J | FR103 | AC |
| D922 | VHD1SS147///-1 | J | 1SS147 | AA |
| D923 | VHD30DF2-FC-1 | J | 30DF2-FC | AE |
| D924 | VHDK34///-1 | J | RK34 | AE |
| D925 | VHD1SS147///-1 | J | 1SS147 | AA |
| D926 | RH-EX0807GEZZ | J | Zener Diode | AC |
| D927 | RH-EX0294CEZZ | J | Zener Diode | AA |
| D928 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D929 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D930 | RH-EX0301CEZZ | J | Zener Diode | AA |
| D954 | RH-EX0316CEZZ | J | Zener Diode | AA |
| D961 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D964 | RH-EX0278CEZZ | J | Zener Diode | AA |
| D965 | VHD1A3-F///-1 | J | 1A3-F | AA |
| D966 | VHD1A3-F///-1 | J | 1A3-F | AA |
| D967 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D2201 | RH-EX0168GEZZ | J | Zener Diode | AA |
| D2401 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D4401 | RH-EX0168GEZZ | J | Zener Diode | AA |
| D5001 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D5002 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D5003 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D5004 | RH-DX0053GEZZ | J | 1SS132 | AA |
| D8851 | RH-EX0168GEZZ | J | Zener Diode | AA |
| D8852 | RH-DX0053GEZZ | J | 1SS132 | AA |
| △ IC901 | RH-FX0005GEZZ | J | Photo Coupler | AE |
| Q851 | RH-PX0233GEZZ | J | Start Sensor | AD |
| Q852 | RH-PX0233GEZZ | J | End Sensor | AD |

PACKAGED CIRCUITS

| | | | | |
|------|---------------|---|------------------|----|
| X501 | RCRSB0166GEZZ | J | Crystal, 4.43MHz | AG |
| X801 | RCRSB0128GEZZ | J | Crystal, 8MHz | AF |

COILS AND TRANSFORMERS

| | | | | |
|--------|---------------|---|--------|----|
| FL2401 | RFILA0020CEZZ | J | Filter | AD |
| L201 | VP-XF151K0000 | J | 150μH | AB |
| L202 | VP-XF150K0000 | J | 15μH | AB |
| L203 | VP-XF330K0000 | J | 33μH | AB |

| Ref. No. | Part No. | ★ | Description | Code |
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| COILS AND TRANSFORMERS (Continued) | | | | |
| L204 | VP-XF120K0000 | J | 12μH | AB |
| L205 | VP-XF820K0000 | J | 82μH | AB |
| L207 | VP-XF560K0000 | J | 56μH | AB |
| L208 | VP-XF151K0000 | J | 150μH | AB |
| L209 | VP-XF560K0000 | J | 56μH | AB |
| L210 | VP-XF151K0000 | J | 150μH | AB |
| L301 | VP-MK101K0000 | J | 100μH | AB |
| L501 | VP-MK391K0000 | J | 390μH | AB |
| L502 | VP-XF680K0000 | J | 68μH | AB |
| L504 | VP-XF150J0000 | J | 15μH | AB |
| L505 | VP-XF100K0000 | J | 10μH | AB |
| L506 | VP-XF390K0000 | J | 39μH | AB |
| L509 | VP-XF151K0000 | J | 150μH | AB |
| L601 | VP-YF822J0000 | J | 8.2mH | AC |
| L602 | VP-DF221K0000 | J | 220μH | AB |
| △ L901 | RCILF0227GEZZ | J | Coil | AM |
| L921 | RCILP0171CEZZ | J | Coil | AD |
| L922 | RCILP0175CEZZ | J | Coil | AD |
| L1551 | VP-XF120K0000 | J | 12μH | AB |
| L1552 | VP-XF120K0000 | J | 12μH | AB |
| L1553 | VP-XF120K0000 | J | 12μH | AB |
| L1554 | VP-XF120K0000 | J | 12μH | AB |
| L1555 | VP-XF120K0000 | J | 12μH | AB |
| L4401 | VP-DF101K0000 | J | 100μH | AB |
| L6601 | VP-XF2R2K0000 | J | 2.2μH | AB |
| L6602 | VP-XF2R2K0000 | J | 2.2μH | AB |
| L6603 | VP-XF2R2K0000 | J | 2.2μH | AB |
| T601 | RTRNH0053GEZZ | J | OSC. Transformer | AE |
| △ T901 | RTRNZ0021AJZZ | V | Transformer | |

CAPACITORS

| | | | | | | |
|------|---------------|---|-------|-----|--------------|----|
| C201 | VCKYCY1HB471K | J | 470p | 50V | Ceramic | AA |
| C202 | VCKYCY1HB391K | J | 390p | 50V | Ceramic | AA |
| C203 | VCCCCY1HH330J | J | 33p | 50v | Ceramic | AA |
| C204 | VCCCCY1HH150J | J | 15p | 50V | Ceramic | AA |
| C205 | VCCCCY1HH330J | J | 33p | 50V | Ceramic | AA |
| C206 | VCCCCY1HH560J | J | 56p | 50V | Ceramic | |
| C208 | VCCCCY1HH820J | J | 82p | 50V | Ceramic | AA |
| C209 | VCKYD41HF104Z | J | 0.1 | 50V | Ceramic | AA |
| C210 | VCKYCY1HF103Z | J | 0.01 | 50V | Ceramic | AA |
| C211 | VCCCPA1HH470J | J | 47p | 50V | Ceramic | AA |
| C212 | VCEAEA1HW474M | J | 0.47 | 50V | Electrolytic | AB |
| C213 | VCKYCY1HB102K | J | 1000p | 50V | Ceramic | AC |
| C214 | VCEAEM1HW224M | J | 0.22 | 50V | Electrolytic | AB |
| C215 | VCCCPA1HH101J | J | 100p | 50V | Ceramic | AA |
| C216 | VCCCCY1HH100D | J | 10p | 50V | Ceramic | AA |
| C217 | VCEAEM1HW105M | J | 1 | 50V | Electrolytic | AB |
| C218 | VCKYCY1HF103Z | J | 0.01 | 50V | Ceramic | AA |
| C219 | VCKYCY1HF223Z | J | 0.022 | 50V | Ceramic | AB |
| C220 | VCEAEM1HW335M | J | 3.3 | 50V | Electrolytic | AB |
| C221 | VCKYCY1HF223Z | J | 0.022 | 50V | Ceramic | AB |
| C222 | VCKYCY1EF104Z | J | 0.1 | 25V | Ceramic | AA |
| C223 | VCEAEM1HW335M | J | 3.3 | 50V | Electrolytic | AB |

| Ref. No. | Part No. | ★ | Description | Code | Ref. No. | Part No. | ★ | Description | Code |
|-------------------------------|---------------|---------|-------------------|------|-------------------------------|---------------|---------|-------------------|------|
| CAPACITORS (Continued) | | | | | CAPACITORS (Continued) | | | | |
| C224 | VCEAEM1HW225M | J 2.2 | 50V Electrolytic | AB | C541 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA |
| C226 | VCEAEA1HW474M | J 0.47 | 50V Electrolytic | AB | C590 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA |
| C228 | VCEAEA1HW224M | J 0.22 | 50V Electrolytic | AB | C601 | VCKYCY1HB821K | J 820 | 50V Ceramic | AA |
| C229 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA | C603 | VCEAEA1HW475M | J 4.7 | 50V Electrolytic | AB |
| C230 | VCEAEM0JW476M | J 47 | 6.3V Electrolytic | AB | C604 | VCEAEM1CW226M | J 22 | 16V Electrolytic | AB |
| C232 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA | C605 | RC-FZ5123BMNK | J | Capacitor | |
| C233 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA | C606 | VCKYCY1HB222K | J 2200p | 50V Ceramic | AA |
| C234 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA | C607 | VCEAEM1CW476M | J 47 | 16V Electrolytic | AB |
| C235 | VCEAEM1CW106M | J 10 | 16V Electrolytic | AB | C608 | RC-FZ5104BMNK | J | Capacitor | |
| C236 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA | C609 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA |
| C237 | VCCCCY1HH330J | J 33p | 50v Ceramic | AA | C610 | VCEAEM1CW226M | J 22 | 16V Electrolytic | AB |
| C238 | VCCCCY1HH5R0C | J 5p | 50V Ceramic | AA | C611 | VCEAGA1CW106M | J 10 | 16V Electrolytic | AA |
| C239 | VCCCCY1HH560J | J 56p | 50V Ceramic | AA | C612 | VCKYCY1EB123K | J 0.012 | 25V Ceramic | AA |
| C240 | VCCCCY1HH391J | J 390p | 50V Ceramic | AA | C614 | VCCCCY1HH151J | J 150p | 50V Ceramic | AA |
| C242 | VCCCCY1HH560J | J 56p | 50V Ceramic | AA | C615 | VCCCCY1HH151J | J 150p | 50V Ceramic | AA |
| C243 | VCCCCY1HH330J | J 33p | 50V Ceramic | AA | C616 | VCKYCY1HB331K | J 330p | 50V Ceramic | AA |
| C244 | VCCCCY1HH221J | J 220p | 50V Ceramic | AA | C617 | VCCCCY1HH220J | J 22p | 50V Ceramic | AA |
| C246 | RC-FZ5473BMNK | J | Capacitor | | C618 | VCEAEM1CW106M | J 10 | 16V Electrolytic | AB |
| C301 | VCEAEM1CW476M | J 47 | 16V Electrolytic | AB | C621 | VCEAEM1CW476M | J 47 | 16V Electrolytic | AB |
| C304 | VCKYD41HF104Z | J 0.1 | 50V Ceramic | AA | C622 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA |
| C305 | VCKYD41HF104Z | J 0.1 | 50V Ceramic | AA | C623 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA |
| C309 | VCCCCY1HH470J | J 47p | 50V Ceramic | AA | C624 | VCQPSA2AA562J | J 5600p | 100V | AC |
| C310 | VCCCCY1HH470J | J 47p | 50V Ceramic | AA | C625 | VCRYPA1HA221J | J 220p | 50V | AB |
| C324 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA | C626 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA |
| C328 | VCKYD41HF104Z | J 0.1 | 50V Ceramic | AA | C701 | VCEAEM1CW106J | J 10 | 16V Electrolytic | AB |
| C329 | VCKYD41EF223Z | J 0.022 | 25V Ceramic | AA | C703 | VCKYCY1HB102K | J 1000p | 50V Ceramic | AA |
| C501 | VCKYCY1HB102K | J 1000p | 50V Ceramic | AA | C704 | VCKYCY1HB102K | J 1000p | 50V Ceramic | AA |
| C503 | VCKYD41CY103N | J 0.01 | 16V Ceramic | AA | C705 | VCCCCY1HH101J | J 100p | 50V Ceramic | AA |
| C504 | VCEAEM0JW476M | J 47 | 6.3V Electrolytic | AB | C706 | VCEAEM0JW476M | J 47 | 6.3V Electrolytic | AB |
| C505 | VCKYCY1HF473Z | J 0.047 | 50V Ceramic | AA | C707 | VCEAEM1CW226M | J 22 | 16V Electrolytic | AB |
| C506 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA | C708 | VCCCCY1HH101J | J 100p | 50V Ceramic | AA |
| C508 | VCKYD41CY103N | J 0.01 | 16V Ceramic | AA | C709 | VCKYCY1HB102K | J 1000p | 50V Ceramic | AA |
| C509 | VCKYCY1EB153K | J 0.015 | 25V Ceramic | AA | C711 | VCKYCY1CF334Z | J 0.33 | 16V Ceramic | AA |
| C510 | VCEAEM1HW335M | J 3.3 | 50V Electrolytic | AB | C712 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA |
| C511 | VCCCCY1HH330J | J 33p | 50v Ceramic | AA | C713 | RC-FZ5104BMNK | J | Capacitor | AA |
| C512 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA | C714 | RC-FZ5223BMNK | J | Capacitor | |
| C513 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA | C715 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA |
| C514 | VCKYCY1HF333Z | J 0.033 | 50V Ceramic | AA | C751 | VCEAEM1CW106M | J 10 | 16V Electrolytic | AB |
| C515 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA | C801 | VCCCCY1HH470J | J 47p | 50V Ceramic | AA |
| C516 | VCEAEA1HW475M | J 4.7 | 50V Electrolytic | AB | C802 | VCCCCY1HH470J | J 47p | 50V Ceramic | AA |
| C517 | VCCCCY1HH180J | J 18p | 50V Ceramic | AA | C803 | VCCCCY1HH470J | J 47p | 50V Ceramic | AA |
| C520 | VCEAEA1HW474M | J 0.47 | 50V Electrolytic | AB | C805 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA |
| C521 | VCKYCY1HF223Z | J 0.022 | 50V Ceramic | AB | C807 | VCCCCY1HH470J | J 47p | 50V Ceramic | AA |
| C522 | VCKYCY1AF105Z | J 0.1 | 10V Ceramic | AA | C808 | VCCSD41HL470J | J 47p | 50V Ceramic | AA |
| C523 | VCEAEM1CW106M | J 10 | 16V Electrolytic | AB | C813 | VCCCCY1HH220J | J 22p | 50V Ceramic | AA |
| C525 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA | C814 | VCCCCY1HH270J | J 27p | 50v Ceramic | AA |
| C526 | VCCCCY1HH680J | J 68p | 50V Ceramic | AA | C816 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA |
| C527 | VCCCCY1HH470J | J 47p | 50V Ceramic | AA | C817 | VCEAGA0JW108M | J 1000 | 6.3V Electrolytic | AC |
| C528 | VCCCCY1HH560J | J 56p | 50V Ceramic | AA | C818 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA |
| C529 | VCEAEA1HW475M | J 4.7 | 50V Electrolytic | AB | C819 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA |
| C530 | VCCCPA1HH121J | J 120p | 50V Ceramic | AA | C820 | VCEAEM1CW476M | J 47 | 16V Electrolytic | AB |
| C531 | VCCCCY1HH1R0C | J 1p | 50V Ceramic | AA | C821 | VCKYCY1HF103Z | J 0.01 | 50V Ceramic | AA |
| C535 | VCCCCY1HH181J | J 180p | 50V Ceramic | AA | C822 | VCKYCY1EF104Z | J 0.1 | 25V Ceramic | AA |
| C536 | VCCCCY1HH181J | J 180p | 50V Ceramic | AA | C823 | VCE9EM1HW105M | J 1 | 50V Elect. (N.P) | AB |
| C537 | VCKYD41CY103N | J 0.01 | 16V Ceramic | AA | C824 | VCEAEM1HW105M | J 1 | 50V Electrolytic | AB |

| Ref. No. | Part No. | ★ | Description | Code |
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CAPACITORS (Continued)

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|--------|---------------|---|-----------------------|----|
| C826 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C829 | VCKYD41CY103N | J | 0.01 16V Ceramic | AA |
| C830 | VCKYCY1HB102K | J | 1000p 50V Ceramic | AA |
| C831 | VCKYCY1HB102K | J | 1000p 50V Ceramic | AA |
| C832 | VCKYCY1HB102K | J | 1000p 50V Ceramic | AA |
| C833 | VCKYCY1HB102K | J | 1000p 50V Ceramic | AA |
| C834 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C835 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| △ C901 | RC-FZ029CUMZZ | U | Capacitor | |
| △ C907 | RC-EZ0440GEZZ | J | Capacitor | AH |
| △ C908 | VCFYAA2GA333K | J | 0.033 400V | AD |
| △ C909 | RC-KZ0112CEZZ | J | Capacitor | AB |
| △ C910 | VCKYPA2HB472K | J | 4700p 500V Ceramic | AB |
| △ C912 | RC-FZ5473BMNK | J | Capacitor | |
| △ C913 | RC-FZ5333BMNK | J | Capacitor | |
| △ C915 | RC-KZ0096GEZZ | J | Capacitor | |
| C921 | VCEAEM0JW107M | J | 100 6.3V Electrolytic | AB |
| C922 | VCEAGA1HW106M | J | 10 50V Electrolytic | AC |
| C923 | VCEAVA1VN477M | J | 470 35V Electrolytic | AD |
| C924 | RC-QZ0104GEZZ | J | Capacitor | AC |
| C925 | VCEAVA1AN477M | J | 470 10V Electrolytic | |
| C927 | RC-FZ5103BMNK | J | Capacitor | |
| C928 | VCEAGA1EW337M | J | 330 25V Electrolytic | AC |
| C929 | VCEAGA1AW337M | J | 330 10V Electrolytic | AB |
| C930 | VCEAGA1HW476M | J | 47 50V Electrolytic | AB |
| C931 | VCEAGA1HW105M | J | 1 50V Electrolytic | AC |
| C932 | VCKYCY1EF104Z | J | 0.1 25V Ceramic | AA |
| C935 | VCKYCY1EF104Z | J | 0.1 25V Ceramic | AA |
| C952 | VCEAEM1HW105M | J | 1 50V Electrolytic | AB |
| C957 | VCEAEM1CW106M | J | 10 16V Electrolytic | AB |
| C958 | VCEAEM1HW105M | J | 1 50V Electrolytic | AB |
| C961 | VCEAEM1CW106M | J | 10 16V Electrolytic | AB |
| C989 | VCKYPA1HF223Z | J | 0.022 50V Ceramic | AA |
| C1551 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C1552 | VCEAGA1CW107M | J | 100 16V Electrolytic | AB |
| C1553 | VCKYD41CY103N | J | 0.01 16V Ceramic | AA |
| C1554 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C1555 | VCEAEM1CW476M | J | 47 16V Electrolytic | AB |
| C1556 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C1557 | VCEAGA1CW106M | J | 10 16V Electrolytic | AA |
| C1561 | VCEAEM1CW106M | J | 10 16V Electrolytic | AB |
| C2201 | VCEAEM1HW335M | J | 3.3 50V Electrolytic | AB |
| C2202 | VCEAEM1HW335M | J | 3.3 50V Electrolytic | AB |
| C2401 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C2402 | VCEAEM1CW106M | J | 10 16V Electrolytic | AB |
| C2403 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C2404 | VCEAEM1HW105M | J | 1 50V Electrolytic | AB |
| C2405 | VCKYCY1HB102K | J | 1000p 50V Ceramic | AA |
| C2406 | VCKYCY1HF223Z | J | 0.022 50V Ceramic | AB |
| C2407 | RC-FZ5563BMNK | J | Capacitor | |
| C2408 | VCEAEM1HW105M | J | 1 50V Electrolytic | AB |
| C4401 | VCEAEM1CW107M | J | 100 16V Electrolytic | AB |
| C4402 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C4403 | VCEA2A0JW477M | J | 470 6.3V Electrolytic | AB |
| C4404 | VCEAGA1CW476M | J | 47 16V Electrolytic | AB |

| Ref. No. | Part No. | ★ | Description | Code |
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CAPACITORS (Continued)

| | | | | |
|-------|---------------|---|----------------------|----|
| C5001 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C5002 | VCEAEM0JW476M | J | 47 6.3V Electrolytic | AB |
| C5003 | VCKYPA1HF103Z | J | 0.01 50V Ceramic | AA |
| C5004 | VCKYD41HB102K | J | 1000p 50V Ceramic | AA |
| C5007 | VCCCCY1HH470J | J | 47p 50V Ceramic | AA |
| C5501 | VCEAEM0JW476M | J | 47 6.3V Electrolytic | AB |
| C6601 | VCCSD41HL100J | J | 10p 50V Ceramic | AA |
| C6602 | VCCCCY1HH100D | J | 10p 50V Ceramic | AA |
| C6603 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |
| C8851 | VCKYCY1HF103Z | J | 0.01 50V Ceramic | AA |

RESISTORS

| | | | | |
|------|---------------|---|------------------------|----|
| R201 | VRD-RA2BE681J | J | 680 1/8W Carbon | AA |
| R203 | VRS-CY1JF822J | J | 8.2k 1/16W Metal Oxide | AA |
| R205 | VRS-CY1JF822J | J | 8.2k 1/16W Metal Oxide | AA |
| R205 | VRS-CY1JF222J | J | 2.2k 1/16W Metal Oxide | AA |
| R206 | VRS-CY1JF561J | J | 560 1/16W Metal Oxide | AA |
| R207 | VRS-CY1JF561J | J | 560 1/16W Metal Oxide | AA |
| R208 | VRS-CY1JF561J | J | 560 1/16W Metal Oxide | AA |
| R209 | VRS-CY1JF821J | J | 820 1/16W Metal Oxide | AA |
| R210 | VRS-CY1JF102J | J | 1k 1/16W Metal Oxide | AA |
| R211 | VRS-CY1JF151J | J | 150 1/16W Metal Oxide | AA |
| R212 | VRS-CY1JF222J | J | 2.2k 1/16W Metal Oxide | AA |
| R213 | VRS-CY1JF222J | J | 2.2k 1/16W Metal Oxide | AA |
| R214 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R215 | VRS-CY1JF222J | J | 2.2k 1/16W Metal Oxide | AA |
| R217 | VRS-CY1JF102J | J | 1k 1/16W Metal Oxide | AA |
| R219 | VRS-CY1JF122J | J | 1.2k 1/16W Metal Oxide | AA |
| R220 | VRS-CY1JF152J | J | 1.5k 1/16W Metal Oxide | AA |
| R226 | VRS-CY1JF152J | J | 1.5k 1/16W Metal Oxide | AA |
| R228 | VRD-RA2BE102J | J | 1k 1/8W Carbon | AA |
| R229 | VRD-RA2BE103J | J | 10k 1/8W Carbon | AA |
| R230 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R301 | VRS-CY1JF682J | J | 6.8k 1/16W Metal Oxide | AA |
| R303 | VRD-RA2BE221J | J | 220 1/8W Carbon | AA |
| R304 | VRS-CY1JF682J | J | 6.8k 1/16W Metal Oxide | AA |
| R305 | VRS-CY1JF272J | J | 2.7k 1/16W Metal Oxide | AA |
| R306 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R307 | VRS-CY1JF223J | J | 22k 1/16W Metal Oxide | AA |
| R309 | VRS-CY1JF222J | J | 2.2k 1/16W Metal Oxide | AA |
| R317 | VRD-RA2BE103J | J | 10k 1/8W Carbon | AA |
| R318 | VRD-RA2BE123J | J | 12k 1/8W Carbon | AA |
| R322 | VRS-CY1JF821J | J | 820 1/16W Metal Oxide | AA |
| R501 | VRS-CY1JF681J | J | 680 1/16W Metal Oxide | AA |
| R502 | VRS-CY1JF821J | J | 820 1/16W Metal Oxide | AA |
| R506 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R507 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R508 | VRS-CY1JF122J | J | 1.2k 1/16W Metal Oxide | AA |
| R510 | VRS-CY1JF273J | J | 27k 1/16W Metal Oxide | AA |
| R511 | VRS-CY1JF472J | J | 4.7k 1/16W Metal Oxide | AA |
| R513 | VRD-RA2BE102J | J | 1k 1/8W Carbon | AA |
| R515 | VRS-CY1JF102J | J | 1k 1/16W Metal Oxide | AA |
| R517 | VRS-CY1JF222J | J | 2.2k 1/16W Metal Oxide | AA |
| R520 | VRD-RA2BE102J | J | 1k 1/8W Carbon | AA |

| Ref. No. | Part No. | ★ | Description | Code | Ref. No. | Part No. | ★ | Description | Code |
|------------------------------|---------------|---|------------------------|------|------------------------------|---------------|---|------------------------|------|
| RESISTORS (Continued) | | | | | RESISTORS (Continued) | | | | |
| R523 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA | R719 | VRD-RA2BE102J | J | 1k 1/8W Carbon | AA |
| R524 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA | R721 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R540 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA | R723 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R601 | VRS-CY1JF100J | J | 10 1/16W Metal Oxide | AA | R724 | VRS-CY1JF684J | J | 680k 1/16W Metal Oxide | AA |
| R602 | VRS-CY1JF333J | J | 33k 1/16W Metal Oxide | AA | R725 | VRS-CY1JF125J | J | 1.2M 1/16W Metal Oxide | AA |
| R603 | VRS-CY1JF221J | J | 220 1/16W Metal Oxide | AA | R801 | VRD-RA2BE471J | J | 470 1/8W Carbon | AA |
| R604 | VRS-CY1JF274J | J | 270k 1/16W Metal Oxide | AA | R803 | VRS-CY1JF102J | J | 1k 1/16W Metal Oxide | AA |
| R605 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA | R804 | VRS-CY1JF102J | J | 1k 1/16W Metal Oxide | AA |
| R606 | VRS-CY1JF472J | J | 4.7k 1/16W Metal Oxide | AA | R805 | VRD-RA2BE471J | J | 470 1/8W Carbon | AA |
| R607 | VRS-CY1JF332J | J | 3.3k 1/16W Metal Oxide | AA | R806 | VRD-RA2BE471J | J | 470 1/8W Carbon | AA |
| R608 | VRS-CY1JF822J | J | 8.2k 1/16W Metal Oxide | AA | R807 | VRS-CY1JF102J | J | 1k 1/16W Metal Oxide | AA |
| R609 | VRS-CY1JF332J | J | 3.3k 1/16W Metal Oxide | AA | R808 | VRS-CY1JF102J | J | 1k 1/16W Metal Oxide | AA |
| R610 | VRS-CY1JF225J | J | 2.2M 1/16W Metal Oxide | AA | R809 | VRD-RA2BE102J | J | 1k 1/8W Carbon | AA |
| R611 | VRS-CY1JF473J | J | 47k 1/16W Metal Oxide | AA | R810 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R612 | VRS-CY1JF562J | J | 5.6k 1/16W Metal Oxide | AA | R811 | VRS-CY1JF104J | J | 100k 1/16W Metal Oxide | AA |
| R613 | VRS-CY1JF473J | J | 47k 1/16W Metal Oxide | AA | R814 | VRD-RA2BE103J | J | 10k 1/8W Carbon | AA |
| R614 | VRS-CY1JF682J | J | 6.8k 1/16W Metal Oxide | AA | R815 | VRS-CY1JF471J | J | 470 1/16W Metal Oxide | AA |
| R615 | VRS-CY1JF823J | J | 82k 1/16W Metal Oxide | AA | R816 | VRD-RA2BE103J | J | 10k 1/8W Carbon | AA |
| R616 | VRS-CY1JF183J | J | 18k 1/16W Metal Oxide | AA | R818 | VRS-CY1JF471J | J | 470 1/16W Metal Oxide | AA |
| R617 | VRS-CY1JF152J | J | 1.5k 1/16W Metal Oxide | AA | R820 | VRS-CY1JF471J | J | 470 1/16W Metal Oxide | AA |
| R618 | VRD-RA2BE153J | J | 15k 1/8W Carbon | AA | R821 | VRS-CY1JF471J | J | 470 1/16W Metal Oxide | AA |
| R619 | VRS-CY1JF101J | J | 100 1/16W Metal Oxide | AA | R822 | VRS-CY1JF471J | J | 470 1/16W Metal Oxide | AA |
| R621 | VRS-CY1JF683J | J | 68k 1/16W Metal Oxide | AA | R824 | VRS-CY1JF102J | J | 1k 1/16W Metal Oxide | AA |
| R622 | VRS-CY1JF683J | J | 68k 1/16W Metal Oxide | AA | R828 | VRS-CY1JF152J | J | 1.5k 1/16W Metal Oxide | AA |
| R623 | VRS-CY1JF333J | J | 33k 1/16W Metal Oxide | AA | R829 | VRD-RA2BE183J | J | 18k 1/8W Carbon | AA |
| R624 | VRS-CY1JF563J | J | 56k 1/16W Metal Oxide | AA | R830 | VRD-RA2BE103J | J | 10k 1/8W Carbon | AA |
| R626 | VRS-CY1JF332J | J | 3.3k 1/16W Metal Oxide | AA | R831 | VRD-RA2BE103J | J | 10k 1/8W Carbon | AA |
| R629 | VRS-CY1JF153J | J | 15k 1/16W Metal Oxide | AA | R840 | VRG-SC2EB2R2J | J | 2.2 1/4W Fuse Resistor | |
| R630 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA | R851 | VRD-RA2EE151J | J | 150 1/4W Carbon | AA |
| R631 | VRS-CY1JF470J | J | 47 1/16W Metal Oxide | AA | R854 | VRD-RA2BE123J | J | 12k 1/8W Carbon | AA |
| R632 | VRS-CY1JF682J | J | 6.8k 1/16W Metal Oxide | AA | R855 | VRD-RA2BE123J | J | 12k 1/8W Carbon | AA |
| R633 | VRG-SC2EB4R7J | J | 4.7 1/4W Fuse Resistor | AB | R856 | VRD-RA2BE103J | J | 10k 1/8W Carbon | AA |
| R635 | VRS-CY1JF153J | J | 15k 1/16W Metal Oxide | AA | R857 | VRS-CY1JF271J | J | 270 1/16W Metal Oxide | AA |
| R636 | VRS-CY1JF223J | J | 22k 1/16W Metal Oxide | AA | R858 | VRS-CY1JF104J | J | 100k 1/16W Metal Oxide | AA |
| R637 | VRD-RA2BE223J | J | 22k 1/8W Carbon | AA | R859 | VRS-CY1JF271J | J | 270 1/16W Metal Oxide | AA |
| R638 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA | R860 | VRS-CY1JF104J | J | 100k 1/16W Metal Oxide | AA |
| R639 | VRS-CY1JF153J | J | 15k 1/16W Metal Oxide | AA | R861 | VRD-RA2BE221J | J | 220 1/8W Carbon | AA |
| R643 | VRS-CY1JF562J | J | 5.6k 1/16W Metal Oxide | AA | R862 | VRD-RA2BE154J | J | 150k 1/8W Carbon | AA |
| R701 | VRD-RA2BE102J | J | 1k 1/8W Carbon | AA | R863 | VRD-RA2BE221J | J | 220 1/8W Carbon | AA |
| R702 | VRS-CY1JF223J | J | 22k 1/16W Metal Oxide | AA | R864 | VRD-RA2BE154J | J | 150k 1/8W Carbon | AA |
| R703 | VRS-CY1JF473J | J | 47k 1/16W Metal Oxide | AA | ⚠ R901 | VRD-RA2HD105J | J | 1M 1/2W Carbon | AA |
| R704 | VRS-CY1JF821J | J | 820 1/16W Metal Oxide | AA | ⚠ R902 | VRC-UA2HG685K | J | 6.8M 1/2W Solid | AA |
| R705 | VRD-RA2BE391J | J | 390 1/8W Carbon | AA | ⚠ R903 | VRC-UA2HG685K | J | 6.8M 1/2W Solid | AA |
| R706 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA | ⚠ R904 | RR-WZ0003GEZZ | J | Resistor | AD |
| R707 | VRD-RA2BE391J | J | 390 1/8W Carbon | AA | ⚠ R905 | RR-SZ0007GEZZ | J | Resistor | AB |
| R708 | VRS-CY1JF473J | J | 47k 1/16W Metal Oxide | AA | ⚠ R906 | VRD-RA2HD154J | J | 150k 1/2W Carbon | AA |
| R709 | VRS-CY1JF333J | J | 33k 1/16W Metal Oxide | AA | ⚠ R907 | VRD-RA2HD154J | J | 150k 1/2W Carbon | AA |
| R710 | VRS-CY1JF155J | J | 1.5M 1/16W Metal Oxide | AA | ⚠ R908 | VRS-VU3AB820J | J | 82 1W Metal Oxide | AB |
| R711 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA | ⚠ R916 | VRD-RA2EE821J | J | 820 1/4W Carbon | AA |
| R712 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA | R921 | VRG-SC2EB1R0J | J | 1 1/4W Fuse Resistor | AB |
| R713 | VRS-CY1JF823J | J | 82k 1/16W Metal Oxide | AA | R922 | VRD-RA2HD100J | J | 10 1/2W Carbon | AA |
| R714 | VRS-CY1JF153J | J | 15k 1/16W Metal Oxide | AA | R924 | VRG-SC2EB100J | J | 10 1/4W Fuse Resistor | AB |
| R716 | VRS-CY1JF393J | J | 39k 1/16W Metal Oxide | AA | R925 | VRD-RA2BE221J | J | 220 1/8W Carbon | AA |
| R717 | VRS-CY1JF102J | J | 1k 1/16W Metal Oxide | AA | R926 | VRS-CY1JF221J | J | 220 1/16W Metal Oxide | AA |
| R718 | VRS-CY1JF183J | J | 18k 1/16W Metal Oxide | AA | R927 | VRD-RA2BE272J | J | 2.7k 1/8W Carbon | AA |

| Ref. No. | Part No. | ★ | Description | Code |
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RSISTORS (Continued)

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|-------|---------------|---|------------------------|----|
| R928 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R929 | VRS-CY1JF183J | J | 18k 1/16W Metal Oxide | AA |
| R930 | VRS-CY1JF392J | J | 3.9k 1/16W Metal Oxide | AA |
| R931 | VRS-CY1JF682J | J | 6.8k 1/16W Metal Oxide | AA |
| R932 | VRS-CY1JF221J | J | 220 1/16W Metal Oxide | AA |
| R933 | VRD-RA2BE222J | J | 2.2k 1/8W Carbon | AA |
| R952 | VRD-RA2HD561J | J | 560 1/2W Carbon | AA |
| R963 | VRS-CY1JF330J | J | 33 1/16W Metal Oxide | AA |
| R964 | VRD-RA2HD472J | J | 4.7k 1/2W Carbon | AA |
| R965 | VRS-CY1JF223J | J | 22k 1/16W Metal Oxide | AA |
| R966 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R967 | VRD-RA2BE183J | J | 18k 1/8W Carbon | AA |
| R971 | VRD-RA2HD561J | J | 560 1/2W Carbon | AA |
| R972 | VRD-RA2BER56J | J | 0.56 1/8W Carbon | AA |
| R973 | VRD-RA2BER56J | J | 0.56 1/8W Carbon | AA |
| R976 | VRS-CY1JF472J | J | 4.7k 1/16W Metal Oxide | AA |
| R979 | VRD-RA2EE391J | J | 390 1/4W Carbon | AA |
| R980 | VRS-CY1JF473J | J | 47k 1/16W Metal Oxide | AA |
| R981 | VRS-CY1JF183J | J | 18k 1/16W Metal Oxide | AA |
| R982 | VRD-RA2EE391J | J | 390 1/4W Carbon | AA |
| R983 | VRS-CY1JF183J | J | 18k 1/16W Metal Oxide | AA |
| R989 | VRD-RA2BE333J | J | 33k 1/8W Carbon | AA |
| R990 | VRS-CY1JF123J | J | 12k 1/16W Metal Oxide | AA |
| R991 | VRS-CY1JF472J | J | 4.7k 1/16W Carbon | AA |
| R1551 | VRS-CY1JF334J | J | 330k 1/16W Metal Oxide | AA |
| R1552 | VRS-CY1JF474J | J | 470k 1/16W Metal Oxide | AA |
| R1803 | VRD-RA2BE125J | J | 1.2M 1/8W Carbon | AA |
| R2201 | VRS-CY1JF750J | J | 75 1/16W Metal Oxide | AA |
| R2202 | VRS-CY1JF101J | J | 100 1/16W Metal Oxide | AA |
| R2203 | VRD-RA2BE391J | J | 390 1/8W Carbon | AA |
| R2401 | VRS-CY1JF392J | J | 3.9k 1/16W Metal Oxide | AA |
| R2402 | VRS-CY1JF681J | J | 680 1/16W Metal Oxide | AA |
| R2403 | VRS-CY1JF154J | J | 150k 1/16W Metal Oxide | AA |
| R2404 | VRS-CY1JF472J | J | 4.7k 1/16W Metal Oxide | AA |
| R2405 | VRS-CY1JF472J | J | 4.7k 1/16W Metal Oxide | AA |
| R2408 | VRD-RA2BE272J | J | 2.7k 1/8W Carbon | AA |
| R2410 | VRS-CY1JF684J | J | 680k 1/16W Metal Oxide | AA |
| R4401 | VRD-RA2BE181J | J | 180 1/8W Carbon | AA |
| R4402 | VRD-RA2BE151J | J | 150 1/8W Carbon | AA |
| R4403 | VRS-CY1JF750J | J | 75 1/16W Metal Oxide | AA |
| R4404 | VRS-CY1JF222J | J | 2.2k 1/16W Metal Oxide | AA |
| R4405 | VRS-CY1JF121J | J | 120 1/16W Metal Oxide | AA |
| R4406 | VRS-CY1JF152J | J | 1.5k 1/16W Metal Oxide | AA |
| R4407 | VRS-CY1JF152J | J | 1.5k 1/16W Metal Oxide | AA |
| R5001 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R5002 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R5003 | VRS-CY1JF471J | J | 470 1/16W Metal Oxide | AA |
| R5004 | VRD-RA2EE1R0J | J | 1 1/4W Carbon | AA |
| R5006 | VRS-CY1JF473J | J | 47k 1/16W Metal Oxide | AA |
| R5007 | VRS-CY1JF473J | J | 47k 1/16W Metal Oxide | AA |
| R5008 | VRS-CY1JF473J | J | 47k 1/16W Metal Oxide | AA |
| R5009 | VRD-RA2BE473J | J | 47k 1/8W Carbon | AA |
| R5501 | VRD-RA2BE331J | J | 330 1/8W Carbon | AA |
| R6601 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |
| R6602 | VRS-CY1JF103J | J | 10k 1/16W Metal Oxide | AA |

| Ref. No. | Part No. | ★ | Description | Code |
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RSISTORS (Continued)

| | | | | |
|-------|---------------|---|------------------------|----|
| R6609 | VRS-CY1JF272J | J | 2.7k 1/16W Metal Oxide | AA |
| R6610 | VRS-CY1JF682J | J | 6.8k 1/16W Metal Oxide | AA |
| R6611 | VRS-CY1JF332J | J | 3.3k 1/16W Metal Oxide | AA |
| R6613 | VRS-CY1JF681J | J | 680 1/16W Metal Oxide | AA |
| R8851 | VRS-CY1JF472J | J | 4.7k 1/16W Metal Oxide | AA |
| R8852 | VRS-CY1JF223J | J | 22k 1/16W Metal Oxide | AA |

MISCELLANEOUS PARTS

| | | | | |
|---------|---------------|---|--------------------------|----|
| △ | QACCB5011UMZZ | U | AC Cord | |
| DG5001 | VVK10BT143G-1 | J | Fluorescent Display Tube | AV |
| △ | F901 | J | Fuse, T2AH/250V | AE |
| FB801 | RBLN-0013GEZZ | J | Balun | AB |
| FB2201 | RBLN-0043CEZZ | J | Balun | AB |
| △ | FH901 | J | Fuse Holder | AC |
| △ | FH902 | J | Fuse Holder | AC |
| P601 | QPLGN0247REZZ | J | Plug, 2pin (AE) | AA |
| P701 | QPLGZ0631GEZZ | J | Plug, 6pin (AO) | AA |
| P702 | QPLGN0247REZZ | J | Plug, 2pin (AL) | AA |
| P704 | QPLGZ1074GEZZ | J | Plug, 10pin (AC) | AC |
| △ | P901 | J | Plug, 2pin (PA) | AB |
| RMC5501 | RRMCU0053GEZZ | J | Remote Receiver | AK |
| S851 | QSW-F0042AJZZ | V | Rec Tip Switch | AG |
| S5001 | QSW-K0002AJZZ | V | Switch, Power | AD |
| S5002 | QSW-K0002AJZZ | V | Switch, Clock (Menu) | AD |
| S5003 | QSW-K0002AJZZ | V | Switch, Mode (Set) | AD |
| SC301 | QSOCN0494REZZ | J | Socket, 4pin (AH) | AC |
| SC601 | QSOCN0895REZZ | J | Socket, 8pin (AA) | AC |
| SC701 | QSOCN0795REZZ | J | Socket, 7pin (AD) | AC |
| SC2201 | QSOCZ1280GEZZ | J | Socket, 12pin | AH |
| TP301 | QPLGN0347REZZ | J | Plug, 3pin (TP301-303) | |
| TP601 | QPLGN0247REZZ | J | Plug, 2pin (TP601-602) | AA |
| TP1551 | QPLGN0347REZZ | J | Plug, 3pin (TP1551-1553) | AA |
| TP5005 | QPLGN0247REZZ | J | Plug, 2pin (TP5005-5006) | AA |

— End of Main —

**DUNTK5097TEVO
OPERATION UNIT**

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| SC8801 | QSOCZ0631GEZZ | J | Socket, 6pin (OA) | AB |
| S8801 | QSW-K0002AJZZ | V | Switch, Stop/Eject | AD |
| S8802 | QSW-K0002AJZZ | V | Switch, PLAY | AD |
| S8803 | QSW-K0079GEZZ | V | Switch, REC | AB |
| S8804 | QSW-K0002AJZZ | V | Switch, Pause/Still | AD |
| S8805 | QSW-K0079GEZZ | V | Switch, Ch ⊕ | AB |
| S8806 | QSW-K0079GEZZ | V | Switch, Ch ⊖ | AB |
| S8807 | QSW-Z0001AJZZ | V | Shuttle Switch | AL |

— End of Operation —

| Ref. No. | Part No. | ★ | Description | Code | Ref. No. | Part No. | ★ | Description | Code |
|--------------------------------|---------------|---|--------------------------------------|------|----------|---------------|---|---|------|
| MECHANISM CHASSIS PARTS | | | | | 47 | MSPRT0379AJFJ | V | Loading Double Action Spring | AB |
| 1 | CCHSM9155TEV0 | V | Main Chassis Ass'y | | 48 | NDAiV1065AJ00 | V | Reel Disk | AB |
| 2 | NROLP0113AJZZ | V | Supply Impedance Roller | AB | 49 | MARMP0053AJZZ | V | Reel Idler | AN |
| 3 | PCAPS1027AJZZ | V | Supply Impedance Roller Cap | AB | 50 | MLEVP0240AJZZ | V | Clutch Lever | AB |
| 4 | PGiDS0027AJZZ | V | Supply Impedance Roller Lower Frange | AA | 51 | NGERH1221AJZZ | V | Clutch Gear Ass'y | AK |
| 5 | NSFTL0563AJFW | V | Supply Impedance Roller Inner | AE | 52 | NPLYV0147AJZZ | V | Reel Pulley Ass'y | AP |
| 6 | LPOLM0050GEZZ | J | Supply Pole Base Ass'y | AM | 53 | NGERH1224AJZZ | V | Playback Gear | AD |
| 7 | LPOLM0051GEZZ | J | Take-Up Pole Base Ass'y | AM | 54 | MLEVP0241AJZZ | V | Clutch Connect Arm | AB |
| 8 | NROLP0110GEZZ | J | Guide Roller | AH | 55 | MLEVP0252AJZZ | V | Take-Up Main Brake Ass'y | AK |
| 9 | MLEVF0414AJZZ | V | Reverse Guide Lever Ass'y | AG | 56 | MLEVP0249AJZZ | V | Take-Up Lock Lever | AC |
| 10 | MSPRD0147AJFJ | V | Reverse Guide Spring | AB | 57 | MLEVP0253AJZZ | V | Supply Main Brake Lever Ass'y | AH |
| 11 | PSPAZ0391AJZZ | V | Reverse Guide Spacer | AE | 58 | MSPRT0380AJFJ | V | Main Brake Spring | AB |
| 12 | RHEDU0083GEZZ | J | Audio/Control Head | AR | 59 | NGERH1225AJZZ | V | Cassette Housing Control Drive Gear | AD |
| 13 | MLEVF0415AJFW | V | Audio/Control Head Arm | AC | 60 | PREFL1004AJZZ | V | Light Guide | AD |
| 14 | MSPRD0148AJFJ | V | Audio/Control Head Arm Spring | AB | 61 | MLEVP0250AJZZ | V | Slow Brake Ass'y | AD |
| 15 | MSPRC0189AJFJ | V | Azimuth Spring | AB | 62 | MSPRD0158AJFJ | V | Slow Brake Spring | AB |
| 16 | RHEDT0032GEZZ | J | Full Erase Head | AK | 63 | RMOTN2051GEZZ | J | Capstan Motor | BD |
| 17 | PSPAZ0392AJZZ | V | Audio/Control Head Arm Spacer | AB | 64 | RMOTM1062GEZZ | J | Loading Motor | AP |
| 18 | QPWBF4735AJZZ | V | Audio/Control Head PWB | AC | 65 | QCNW-0156AJZZ | V | Lead Wire for Loading Motor | AE |
| 19 | QSOCN0885REZZ | J | Socket, 8 pin | AB | 66 | QCNW-0155AJZZ | V | FFC for Audio/Control | AF |
| 20 | NBLTK0065AJ00 | V | Reel Belt | AE | 67 | QCNW-0247AJZZ | V | FFC for Drum Motor | |
| 21 | MLEVF0416GEZZ | J | Pinch Roller Lever Ass'y | AU | 70 | PGiDC0052GEFW | J | Drum Base | AK |
| 22 | MLEVP0237AJZZ | V | Pinch Double Action Lever | AD | 71 | XBPSD30P08J00 | J | Drum Base Mounting Screw (SW3P+8S) | AA |
| 23 | MLEVF0417AJZZ | V | Pinch Drive Lever Ass'y | AG | 72 | QBRSK0034GEZZ | J | Drum Earth Brush | AD |
| 24 | NGERH1216AJZZ | V | Pinch Drive Cam | AE | 73 | MSPRC0194GEFJ | J | Drum Earth Brush Spring | AA |
| 25 | MLEVP0238AJZZ | V | Open Lever | AC | 74 | RMOTP1124GEZZ | J | Drum Drive Motor | AT |
| 26 | MSPRT0377AJFJ | V | Pinch Double Action Spring | AC | 75 | XBPSD26P06J00 | J | Drum Drive Motor Mounting Screw (SW2.6P+6S) | AA |
| 28 | MLEVF0418AJZZ | V | Tension Arm Ass'y | AG | 76 | DDRMW0014TEV1 | V | Upper and lower drum Ass'y | |
| 29 | LBOSZ1001AJZZ | V | Tension Arm Boss | AB | | | | | |
| 30 | MSPRT0378AJFJ | V | Tension Spring | AC | | | | | |
| 31 | LBNDK1008AJZZ | V | Tension Band Ass'y | AG | | | | | |
| 32 | NSFTP0032AJZZ | V | Tension Pole Adjust Cam | AB | | | | | |
| 33 | NGERH1217AJ00 | V | Master Cam | AE | | | | | |
| 34 | NPLYV0151AJZZ | V | Motor Pulley | AB | | | | | |
| 35 | NGERW1058AJZZ | V | Worm Gear | AC | | | | | |
| 36 | NGERW1052AJZZ | V | Worm Wheel Gear | AC | | | | | |
| 37 | NGERH1218AJZZ | V | Connect Gear | AC | | | | | |
| 38 | LHLDZ1931AJZZ | V | Loading Motor Block | AD | | | | | |
| 40 | MSLiP0006AJZZ | V | Shifter | AH | | | | | |
| 41 | MLEVF0419AJZZ | V | Shifter Drive Lever Ass'y | AG | | | | | |
| 42 | NGERH1219AJZZ | V | Take-Up Loading Gear | AD | | | | | |
| 43 | MLEVF0420AJZZ | V | Take-Up Loading Arm Ass'y | AG | | | | | |
| 44 | NGERH1220AJZZ | V | Supply Loading Gear | AC | | | | | |
| 45 | MLEVF0422AJZZ | V | Supply Loading Arm Ass'y | AG | | | | | |

— End of Mechanism Chassis Parts —

Ref. No. Part No. ★ Description Code

CASSETTE HOUSING CONTROL PARTS

| | | | | |
|-----|---------------|---|--|----|
| 300 | CHLDX3070TEV3 | V | Cassette Housing Control Ass'y | |
| 301 | LHLDX1024AJ00 | V | Frame (L) | AG |
| 302 | LHLDX1025AJ00 | V | Frame (R) | AG |
| 303 | NGERR3003AJFW | V | Drive Angle | AE |
| 304 | NGERR1005AJZZ | V | Double Action Rack | AC |
| 305 | MSPRT0381AJFJ | V | Double Action Spring | AC |
| 306 | MSLiF0070AJFW | V | Slider | AH |
| 307 | LHLDX1026AJ00 | V | Holder (L) | AD |
| 308 | MLEVP0246AJ00 | V | Proof Lever (L) | AB |
| 309 | MSPRD0150AJFJ | V | Proof Lever (L) Spring | AB |
| 310 | LHLDX1027AJ00 | V | Holder (R) | AD |
| 311 | MSPRP0159AJFJ | V | Cassette Spring | AD |
| 312 | MLEVF0424AJFW | V | Proof Lever (R) | AC |
| 313 | MSPRD0151AJFJ | V | Proof Lever (R) Spring | AB |
| 314 | NGERH1242AJ00 | V | Drive Gear (L) | AD |
| 316 | NGERH1227AJ00 | V | Drive Gear (R) | AD |
| 317 | MSPRD0153AJFJ | V | Drive Gear (R) Spring | AC |
| 318 | NGERH1228AJ00 | V | Synchro Gear | AC |
| 319 | NSFTD0036AJFD | V | Main Shaft | AG |
| 320 | LANGF9581AJFW | V | Upper Plate | AH |
| 321 | MLEVP0247AJ00 | V | Door Open Lever | AC |
| 322 | MLEVP0248AJ00 | V | Sensor Lever | AB |
| 323 | MSPRT0382AJFJ | V | Sensor Lever Spring | AB |
| 324 | XHPSD30P06WS0 | J | C3P+6S (for Cassette Housing Control) | AA |

Ref. No. Part No. ★ Description Code

SCREWS, NUTS AND WASHERS

| | | | | |
|-----|---------------|---|---|----|
| 200 | LX-XZ3030GEFD | J | Set Screw | AC |
| 201 | LX-BZ3095GEFD | J | Audio/Control Head Screw | AA |
| 202 | LX-BZ3096GEFD | J | Tilt Adjusting Screw | AA |
| 203 | XBPSD26P06000 | J | Azimuth Adjusting Screw (2.6P+6S) | AA |
| 204 | XHPSD26P08WS0 | J | Screw, C2.6P+8S (For FE Head) | AA |
| 206 | XBPSD30P05J00 | J | Screw, SW3P+5S (For Loading Motor Block) | AA |
| 207 | XHPSD26P07WS0 | J | Screw, C2.6P+7S (For Capstan Motor) | AA |
| 208 | XHPSD26P06WS0 | J | Screw, C2.6P+6S (For Loading Motor Angle Ass'y) | AA |
| 209 | XHPSD30P08WS0 | J | Screw, C3P+8S (For Drum Base) | AA |
| 210 | LX-NZ3046GEFW | J | X-Position Adjusting Nut | AB |
| 211 | LX-NZ3019GEZZ | J | Reverse Guide Adjusting Nut | AB |
| 212 | XNFSD40-31000 | J | Audio/Control Head Adjusting Nut (M4) | AB |
| 214 | XWHJZ52-05110 | J | Washer, W5.2P-11-0.5 (Reel Height Adj.) | AB |
| 215 | XWHJZ52-03110 | J | Washer, W5.2P-11-0.3 (Reel Height Adj.) | AB |
| 216 | XWHJZ52-04110 | J | Washer, W5.2P-11-0.4 (Reel Height Adj.) | AB |
| 217 | XWHJZ52-06110 | J | Washer, W5.2P-11-0.6 | AB |
| 218 | XWHJZ52-07110 | J | Washer, W5.2P-11-0.7 | AB |
| 219 | XWHJZ31-02070 | | Washer, W3.1-7-0.25 | AA |
| 220 | LX-WZ1073GE00 | J | Cut Washer, CW4.5P-10-0.5 | AB |
| 221 | LX-WZ1006GE00 | J | Cut Washer, CW2.6P-5.4-0.5 | AA |
| 222 | LX-WZ1041GE00 | J | Cut Washer, CW2.6P-6-0.5 | AA |
| 223 | XRESJ40-06000 | J | E-Ring, E-4 | AA |
| 229 | XHPSD30P04WS0 | J | Screw, C3P+4S (For Slow Brake Spring) | AA |

— End of Cassette Housing Control Parts —

— End of Screws, Nuts And Washers —

| Ref. No. | Part No. | ★ | Description | Code | Ref. No. | Part No. | ★ | Description | Code |
|-------------------------|---------------|---|------------------------|------|--------------------------|---------------|---|-------------------------|------|
| MECHANICAL PARTS | | | | | FRONT PANEL PARTS | | | | |
| 601 | CCABB1156TEV0 | U | Main Frame Ass'y | | 501 | CPNLC2005TEV0 | U | Front Panel Ass'y | |
| 601-1 | GCABB1156UMZZ | U | Main Frame | | 501-1 | HPNLC2005UMSA | U | Front Panel | |
| 601-2 | PFLT-0016AJZZ | V | Foor Felt | AB | 501-2 | HBDGB1008AJSA | V | Badge, "SHARP" | AE |
| 602 | GCOVA1890UMZZ | U | Antenna Terminal Cover | | 501-3 | HDECQ1309UMSA | U | Cassette Flap | |
| 603 | GCABA3098UMS3 | U | Top Cabinet | | 501-4 | HDECQ1279UMSA | U | Front Decoration Window | |
| 604 | GBDYU3095UMZZ | U | Bottom Plate | | 501-5 | JBTN-2638UMSA | U | Button, Operate | |
| 605 | LANGQ9059UMZZ | U | Toe Cabinet Fixing | | 501-6 | JBTN-2639UMSA | U | Button, Channel/Rec | |
| | | | Angle (R) | | 501-7 | JBTN-2640UMSA | U | Button, Channel Set | |
| 606 | LANGQ9062UMZZ | U | Top Cabinet Fising | | 501-8 | MSPRD0103AJFJ | V | Cassette Spring | AB |
| | | | Angle (L) | | 502 | JKNBK1086UMSA | U | Dial | |
| 607 | PSLDM4499UMFW | U | H/A Shield | | 503 | CBTN-2642TEV0 | U | Button Ass'y | |
| 608 | PSPAZ0477UMZZ | U | Spacer | | 503-1 | JBTN-2643UMSA | U | Button, Stop/Eject | |
| 609 | XEBSD30P10000 | V | Screw | AA | 503-2 | JBTN-2650UMSA | U | Button, Pause/Still | |
| 610 | XEBSD30P12000 | V | Screw | AA | 503-3 | LHLDZ1929UMSM | U | Button Holder | |
| 611 | XEBSD40P12000 | V | Screw | AA | 503-4 | MSPRC0195AJFJ | V | Spring | |
| 612 | XESSF30P12000 | V | Screw | AA | 503-5 | JBTN-2642UMSA | U | Button, Play | |
| 613 | XHPSD30P06WS0 | V | Screw | AA | | | | | |
| 614 | LX-HZ3030GEZZ | J | Screw | AA | | | | | |
| 615 | PSPAZ0390AJZZ | V | Spacer | AC | | | | | |
| 616 | XBPSD30P06000 | V | Screw | AA | | | | | |
| 618 | PSPAZ0518UMZZ | U | Spacer | | | | | | |

—— End of Front Panel Parts ——

SUPPLIED ACCESSORIES

ACCESORIES

| | | | |
|---------------|---|---|----|
| QCNW-7544UMZZ | U | 75ohm Coaxial Cable | AM |
| RRMCG0009AJSA | V | Infrared Remote Control Unit | AY |
| GCOVH0042LASA | V | Battery Cover, Infrared Remote Control Unit | |

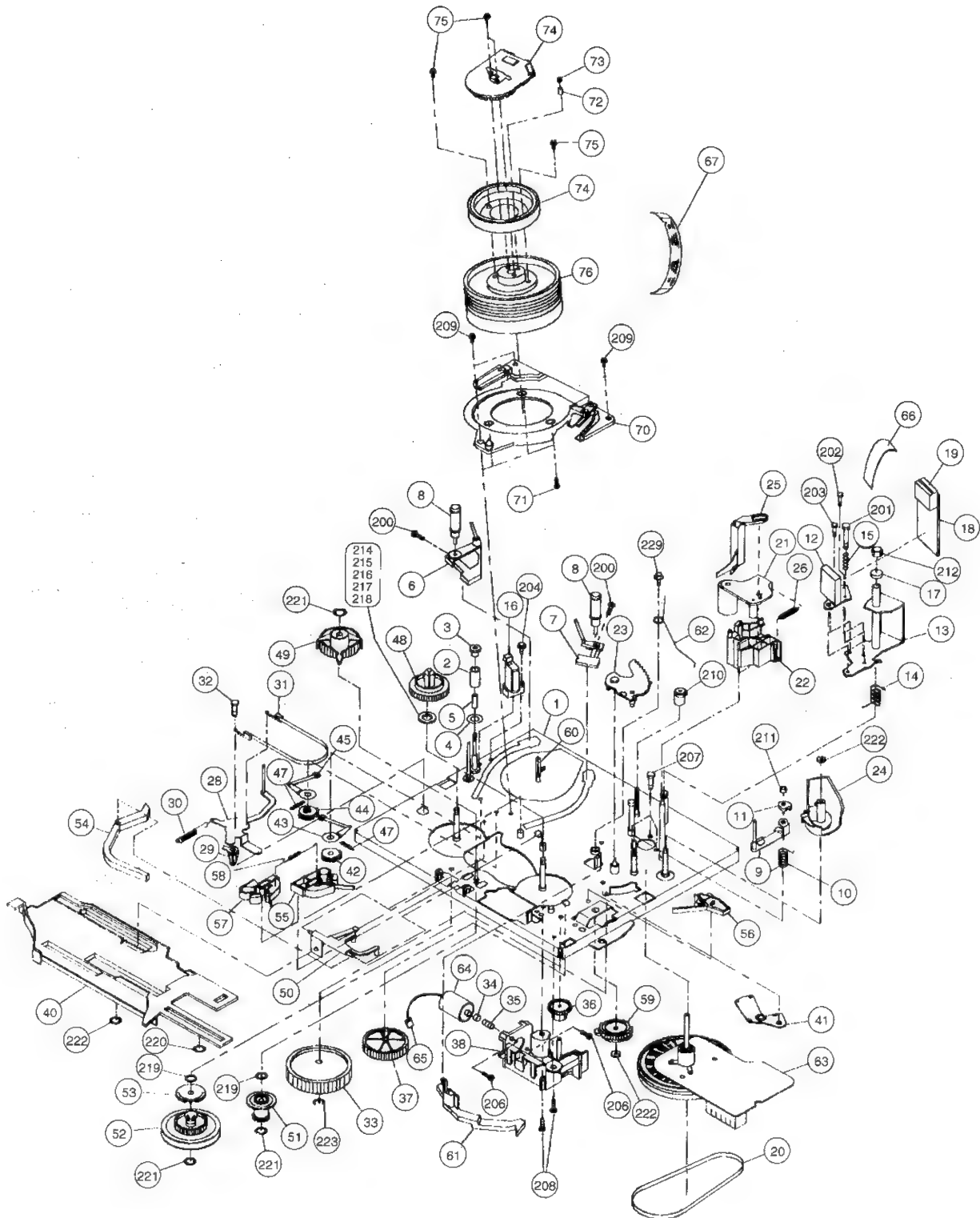
ACCESORIES (NOT REPLACEMENT ITEM)

| | | | |
|---------------|---|-------------------------|---|
| TGAN-3135UMZZ | - | Guarantee Card | — |
| TINS-2574UMZZ | - | Operation Manual | — |
| TINS-2597UMZZ | - | Quick Set-up Guide Card | — |

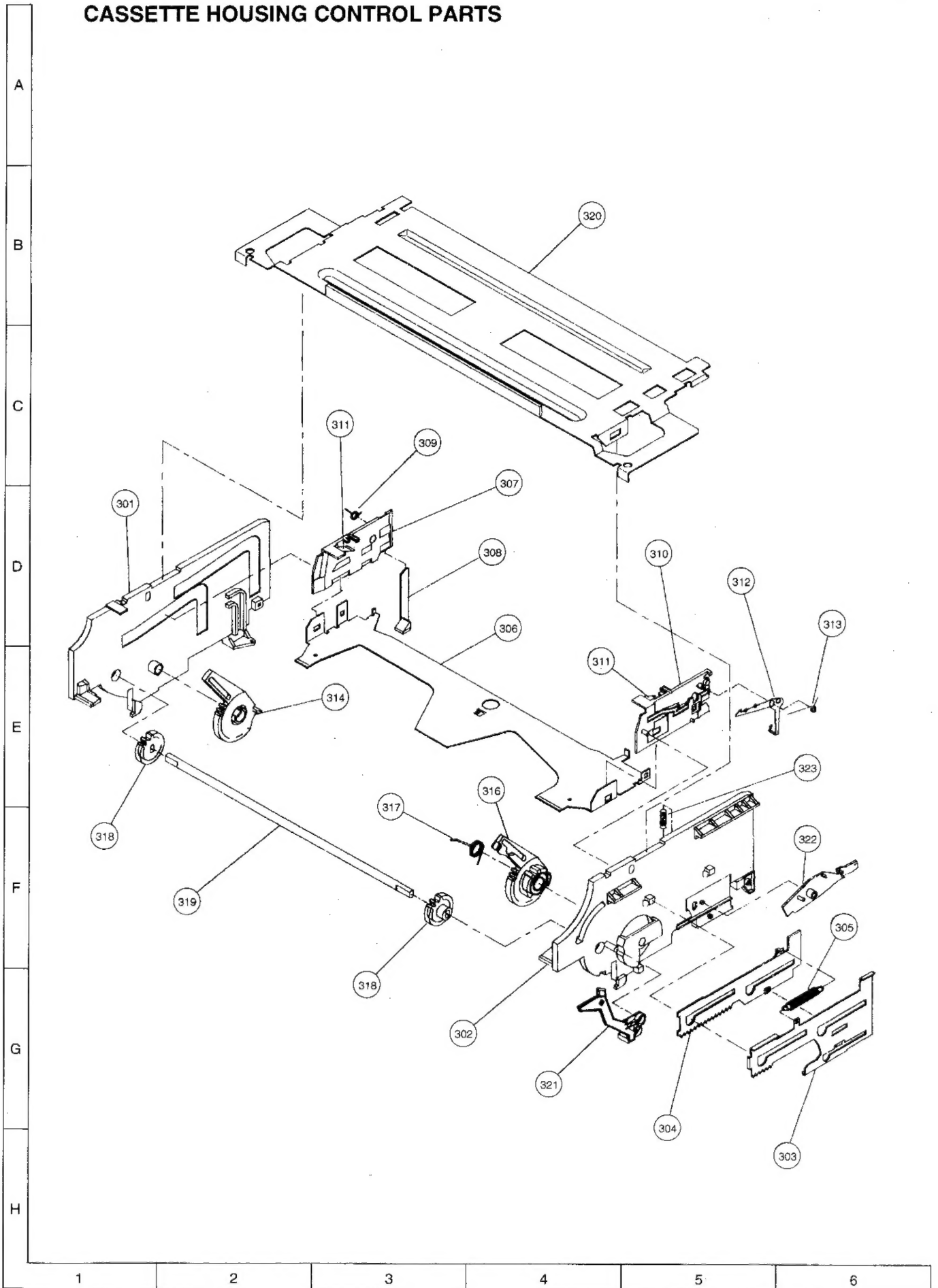
—— End of Mechanical Parts ——

—— End of Supplied Accessories ——

11. EXPLODED VIEWS MECHANISM CHASSIS PARTS

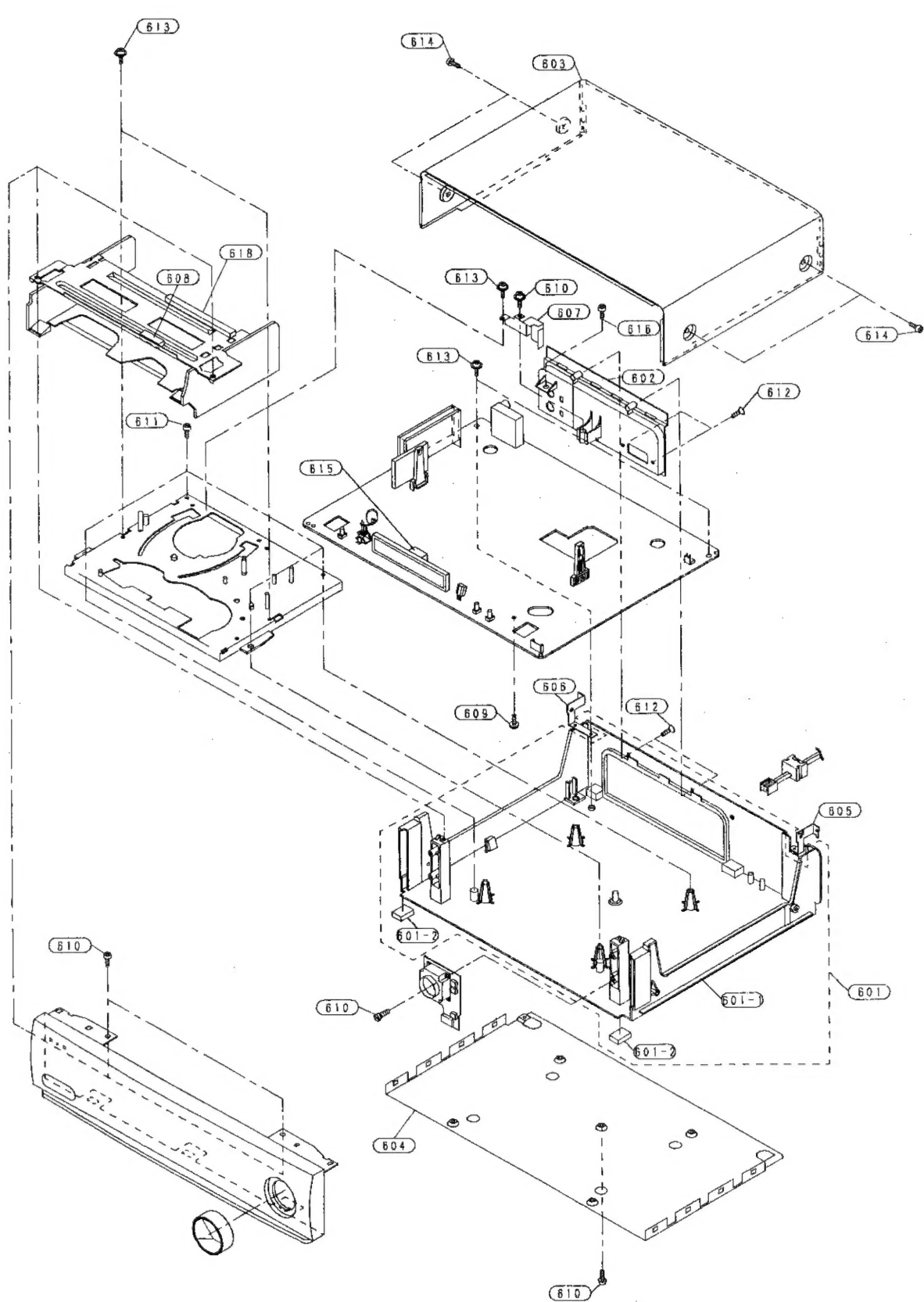


CASSETTE HOUSING CONTROL PARTS



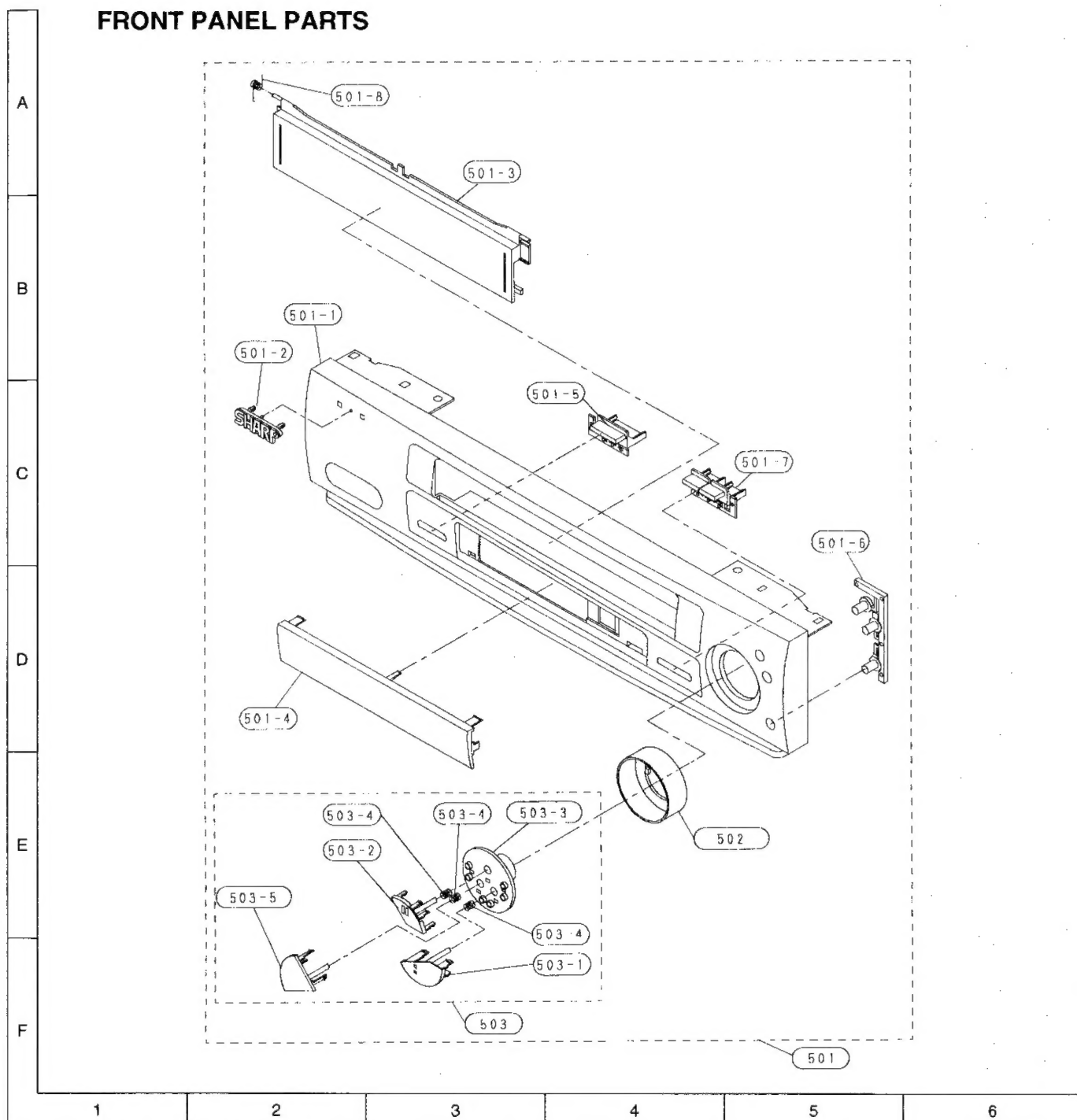
MECHANICAL PARTS

A
B
C
D
E
F
G
H

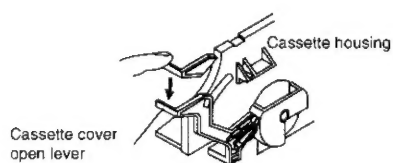


1 2 3 4 5 6

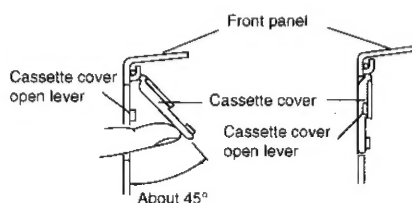
FRONT PANEL PARTS



PRECAUTION ON FRONT PANEL SET-UP

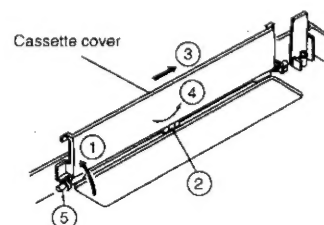


Before attaching the front panel in position, make sure that the cassette cover open lever is in its right place (lower-most). If it is out of position, push it down with a finger.



Keep the cassette cover about 45° open and make sure that the cassette cover open lever is between the front panel and the cassette cover. Now fix the front panel in place.

Do not mount the front panel with the cassette cover tilted too open. Otherwise the cassette cover might wrongly run on the cassette housing.



ing.
Removing the cassette compartment cover.
① Open the cassette compartment cover fully.
② Remove the center positioner.
③ Slide the cover to the right.
④ Slightly bend the cover.
⑤ Draw out the left-side rod.

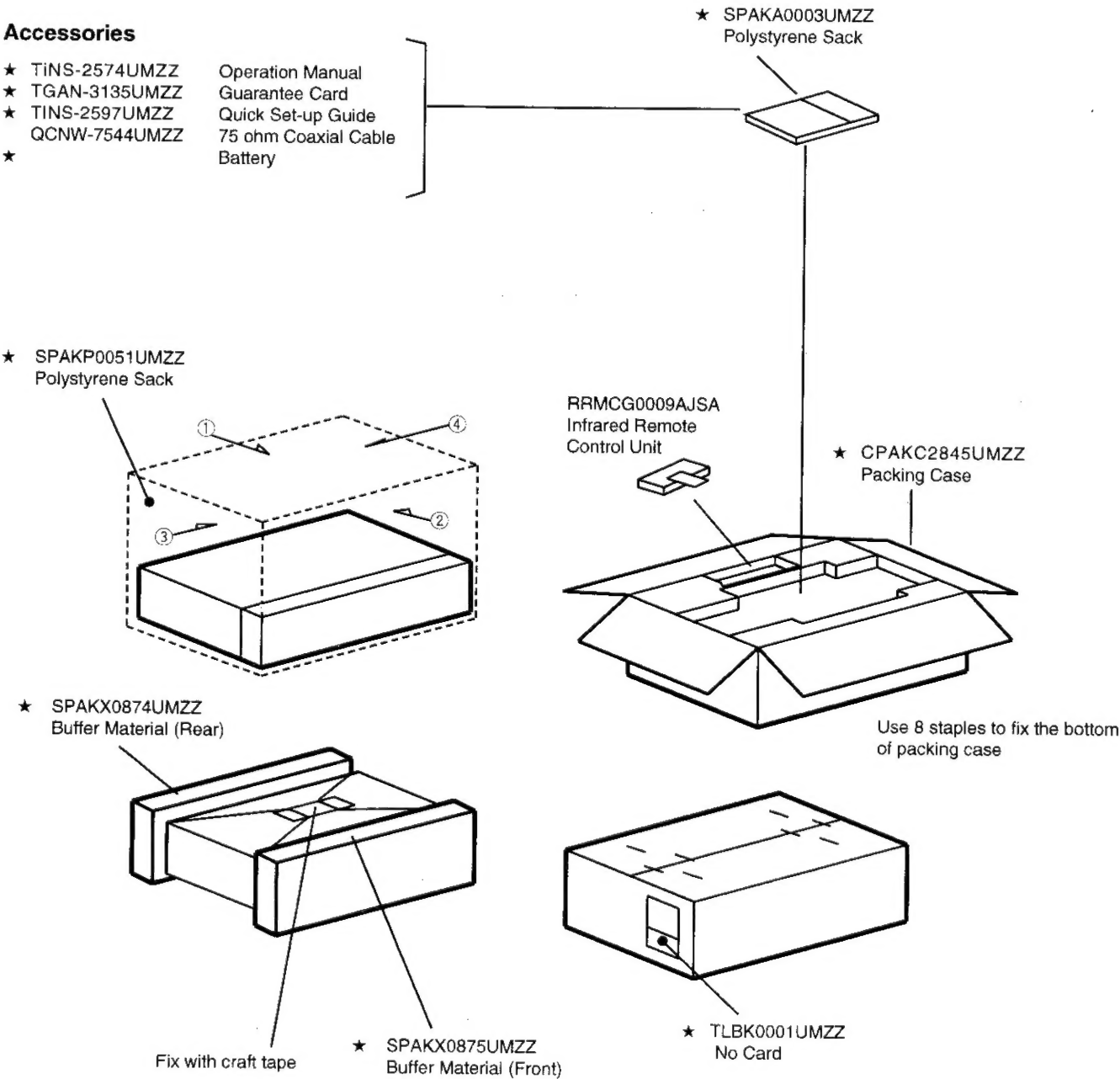
12. PACKING OF THE SET

■ Setting position of the Knobs

| | | | |
|---------------------|------------------|-------------|-------------------|
| RF conv. CH. preset | at "E36" channel | Test Signal | at "OFF" position |
|---------------------|------------------|-------------|-------------------|

Accessories

- ★ TINS-2574UMZZ Operation Manual
- ★ TGAN-3135UMZZ Guarantee Card
- ★ TINS-2597UMZZ Quick Set-up Guide
- ★ QCNW-7544UMZZ 75 ohm Coaxial Cable
- ★ Battery



MARK ★ Not Replacement Item